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A users handbook of sewage sludge application rates to agricultural lands. Based on a model, tables are presented for ten or more major crops in 42 states or portions of states. Tabular application rate data are presented for sludge application rates in 42 areas. These rates consider the crops grown, their expected yield, the nature of the sludge (aerobic or anaerobic, type of application (surface or soil incorporated), nature of the soil, and land slope. A model is also presented and, if data are available, site specific application rates can be estimated. Considered in the application rates are prevention of damage to crops, protection of neighboring waters from pollution by erosion of applied sludge, and rates of use of nutrients by the crops grown. Resulting sludge application rates are considered conservative to reduce risk to the land and crops, and nonpoint pollution of waters.

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Work Assignment 61
Lowell E. Keup, EPA Work Assignment Manager
Elvia Niebla and Robert Thronson, Co-Managers

by

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INTRODUCTION

Sewage sludge is a nutrient-rich resource that has the potential to enhance the quality of cropland and orchard soils with increased fertility and improved soil structure. Sludge application to these agricultural lands can also provide an alternative disposal method for an otherwise underused, valuable resource. However, as with commercial fertilizers, sludge must be applied to agricultural soils using proper management practices.

The objective of this manual is to provide a handbook of sludge application rates for users (farmers, extension agents, agronomists, etc.) in major crop-producing states who choose to apply sewage sludge to soils. This material is presented in a fashion that will allow the user to select the appropriate sludge application rates based on the conditions at the individual farms.

MANUAL DEVELOPMENT

The effort originally undertaken in this manual sought to address a number of issues raised by the application of sludge to agricultural land: What maximum rate of sludge could be applied without adversely affecting crop yield? How would the type of sludge and its ingredients affect the application rate? What is the effect of tillage practices? How should the non-point source pollution from surface runoff be dealt with?

Emphasis was initially directed towards uncovering existing literature. An extensive literature search was carried out (see the section entitled "Comparison of Model-Recommended Rates with the Literature"), with the emphasis on studies which might yield maximum rates of application which do not inhibit crop yield. This would have provided an upper limit to any sludge application rates later proposed. However, information obtained in this area was very limited. Hence, the focus was shifted to a review of the methodologies proposed by the U.S. EPA and some individual states for land application of sludge. The need was seen for a model that would predict sludge application rates to optimally satisfy plant nutrient requirements. This model would then incorporate environmental factors such as rainfall, type of sludge, and potential for runoff.

It was apparent during the preparation of this manual that several methods for calculating application rates for sewage sludge are available. These various methods share common properties and incorporate similar assumptions. One common characteristic is that the methods require the user to calculate sludge application rates on a case-by-case basis after background information on application sites and crops to be grown is gathered.

In this manual we have attempted to relieve the user of the burden of calculating sludge application rates, in order to provide a convenient ready-to-use handbook. The method for calculating sludge application rates has been developed from previous methods and includes several additional assumptions. The recommended rates of application for various crops have been calculated, compiled into tables and organized by state and crop. The tables take into account various soil types, yield goals, soil slopes, sludge types, type of sludge application, and potential for surface runoff. Crop prevalence in different states was also taken into consideration. For example, sludge application for citrus trees was determined only for Arizona, California, Florida and Texas.

To produce this manual a number of assumptions were made. These are explained in the section entitled "Variable Selection and Model Assumptions". The assumptions are deliberately conservative resulting in the recommendation of relatively low application rates compared to many applications reported in agronomic literature. This approach avoids some of the problems that are theoretically possible with land application of sludge while allowing for long-term application. Basing a manual such as this one on a set of assumptions has both advantages and disadvantages. The major advantage is that tables of recommended application rates for many different farming conditions can be made available, and other tables could easily be developed by changing input parameters. Thus, the user is relieved of the burden of calculating sludge application rates. Another advantage is the ease and speed with which sludge application rates for a given situation can be determined, making this manual a handbook available for immediate use. On the other hand, the assumptions used can always be criticized as being too conservative or too liberal, too broad or too narrow, too universal or too specific. The authors recognize the potential deficiencies and compared the recommended application rates with rates used in various experiments by agronomists and soil scientists (see the section entitled Comparison of Manual-Recommended Application Rates with the Literature). The rates recommended in this manual are considerably lower than those typically used in experimentation, basically because the manual rates consider the potential for surfacewater pollution due to runoff, and are based on long-term sludge application for fertility purposes, as opposed to disposal purposes.

In addition, this manual is the first iteration of a product that hopefully will be improved with use. Feedback from the user is important to improve this manual in the future, and a user's comment sheet can be found in the appendices.

TYPES OF SEWAGE SLUDGE

Sewage is comprised of the solids and accompanying liquids removed during the municipal wastewater treatment process. Raw sludge derived from the physical, biological, or chemical treatment of wastewater generally contains from 93 to 99.5 percent water. The raw sludge is subsequently processed to reduce the water content and to make it more safe and economical for utilization or final disposal.

Sewage sludge type is generally determined by the treatment process utilized. Raw (also called untreated) sludge consists of primary and/or secondary sludge. Primary sludge includes material that settled out in the sedimentation tank (primary clarifier) and is composed of gray, viscous and identifiable solids which are putrescible and odorous (Ingram, 1976). Primary sludge contains between 93 to 95 percent water. After settling, the wastewater is biologically treated (e.g. activated sludge, trickling filters) in which microorganisms break down the organic materials in the waste. The solids generated from this process are known as secondary sludge. This material is black or brown, granular or soft, and partly decomposed. Secondary sludge is not highly odorous when fresh. These sludges have a relatively low solids content (0.5 to 7 percent; U.S EPA, 1984).

One of the important processes in raw sludge treatment is sludge digestion, which can be accomplished in several ways: anaerobic (the absence of oxygen) and aerobic (in the presence oxygen) digestion, sludge lagoons, and Imhoff tanks (Metcalf & Eddy, 1978). These stabilization processes reduce the volume of raw sludge by 25 to 40 percent. The treated (digested) sludge is very dark in color, has a homogenous texture, and is less offensive (with respect to odor) compared to primary and secondary sludges. As shown in Table 1, different treatment methods result in different sludge characteristics. Treated sludges contain nutrients (e.g. nitrogen, phosphorus, potassium) required for plant growth and may be used as soil conditioners and weak fertilizers under certain conditions.

TABLE 1. CONCENTRATIONS[a] OF ORGANIC CARBON (C), TOTAL NITROGEN (N), PHOSPHORUS (P), AMMONIA (NH_4^+), NITRATE (NO_3N^-) SULFUR(S), AND POTASSIUM (K) IN SEWAGE SLUDGE (U.S. EPA, 1983)

Component	Sludge Type[b]	Number of Samples	Range	Median[c]	Mean
Organic C, %	Anaerobic	31	18-39	26.8	27.6
	Aerobic	10	27-37	29.5	31.7
	Other	60	6.5-48	32.5	32.6
	All Samples	101	6.5-48	30.4	31.0
Total N, %	Anaerobic	85	0.5-17.6	4.2	5.0
	Aerobic	38	0.5- 7.6	4.8	4.9
	Other	68	<0.1-10.0	1.8	1.9
	All Samples	191	<0.1-17.6	3.3	3.9
NH_4^+ -N, mg/kg	Anaerobic	67	120-67,600	1,600	9,400
	Aerobic	33	30-11,300	400	950
	Other	3	5-12,500	80	4,200
	All Samples	103	5-67,600	920	6,540
NO_3^- -N, mg/kg	Anaerobic	35	2-4,900	79	520
	Aerobic	8	7-830	180	300
	Other	3	--	--	780
	All Samples	46	2-4,900	140	490
Total P, %	Anaerobic	86	0.5-14.3	3.0	3.3
	Aerobic	38	1.1- 5.5	2.7	2.9
	Other	65	<0.1-3.3	1.0	1.3
	All Samples	189	<0.1-14.3	2.3	2.5
Total S, %	Anaerobic	19	0.8-1.0	1.1	1.2
	Aerobic	9	0.6-1.1	0.8	0.8
	Other	--	--	--	--
	All Samples	28	0.6-1.5	1.1	1.1
K, %	Anaerobic	86	0.02-2.64	0.30	0.52
	Aerobic	37	0.08-1.10	0.39	0.46
	Other	69	0.02-0.87	0.17	0.20
	All Samples	192	0.02-2.64	0.30	0.40

(a) Concentrations and percent composition are on a dried solids basis.

(b) "Other" includes lagooned, primary, tertiary, and unspecified sludges.

(c) Median concentrations are reported to be better measures of "typical" concentration than the arithmetic mean.

-- Not reported

POTENTIAL BENEFITS OF SLUDGE APPLICATION TO LAND

The benefits of applying sludge to croplands are two-fold. First, when properly used, sludge is a valuable resource as a soil conditioner and partial fertilizer. This is considered an effective sludge management method, especially in terms of resource recovery/reuse. Municipal sewage sludge contains considerably lower quantities of nutrients than commercial fertilizers. However, sludge has been used successfully as a fertilizer supplement. Based on 1983 fertilizer prices in South Central United States, a metric ton of dry sludge contains approximately $9.08 worth of nitrogen, $28.33 worth of phosphorus and $.66 worth of potassium (U.S. EPA, 1984). The nutrients in sludge may be utilized by virtually all crops, including grains and animal feeds, and can be as effective as commercial fertilizers. For example, studies conducted with 16 different types of barley indicated that sewage sludge was as valuable a nutrient source as a commercial fertilizer (Day et al., 1983). Land-applied sludge acts as a soil conditioner to facilitate nutrient uptake, increase water retention, permit easier root penetration, and improve soil texture. Improved soil texture reduces runoff and erosion and makes soil easier to work. In addition to nitrogen, phosphorus, potassium, and sulfur (Table 1), sewage sludge contains varying concentrations of micronutrients such as calcium, magnesium, sodium, copper, zinc, boron, molybdenum, iron, manganese and cobalt. Unlike some of the mineral fertilizers, sludge releases some nutrients (e.g. nitrogen) slowly in a continuum of availability to the crops. Consequently, sludge application has an additional avantage when compared to mineral fertilizers that are subject to rapid loss due to leaching and surface runoff.

Second, land application is an effective method of managing the ever increasing quantities of municipal sewage sludge. In the United States, municipalities annually generate approximately 6.5 million dry tons of wastewater sludge (U.S. EPA, 1984). This is equivalent to 56 dry pounds of sludge per person per year. By the year 2000, it is anticipated that the amount of sludge generated will double to approximately 13 million dry tons per year.

Agricultural application of sludge is often economical for the municipality and the landowner. Farmland to which sludge is applied represents a low cost disposal alternative as opposed to the higher costs of incineration, landfilling, and dedicated land disposal, where the municipality usually owns the land. Landowners save money by reducing their need for commercial fertilizers. However, land application of sludge for agriculture can increase sludge processing costs for municipalities, because sludges used for land application must be treated to minimize potential health risks, aesthetic, and environmental problems.

POTENTIAL PROBLEMS WITH SLUDGE APPLICATION

In addition to plant nutrients, sewage sludge contains materials that are either nonessential to plant growth or harmful to the environment if available in excessive amounts. These materials, which include some metals and toxic organic compounds, can gain access to sewage sludge from the industrial waste streams that are discharged to some municipal wastewater collection system. Potential contaminants can be transported from sludge to the environment as depicted in Figure 1 with relatively high rates of sludge application, plant uptake and leaf adsorption can either result in phytotoxicity or affect animals or humans who consume the plant. Other problems possible from excessive sludge application are surfacewater and groundwater pollution.

Pollutants or contaminants in sludge can be divided into three categories: physical, chemical, and biological (U.S. EPA, 1983). Physical contaminants are mainly solids in the sludge that will not be dissolved in water. With heavy rains, these solids (especially light materials) could be carried with surface runoff to streams or lakes. Increases in suspended matter in receiving waters can reduce the productivity of these waterbodies.

Chemical pollutants include nutrients, heavy metals, and toxic organic compounds. Nutrients such as nitrogen and phosphorus, when present in excess, can cause groundwater and surfacewater pollution. Increased nutrient levels in receiving waters may lead to elevated growth of algae and other aquatic plants (Figure 1). Proper land management and sludge incorporation can

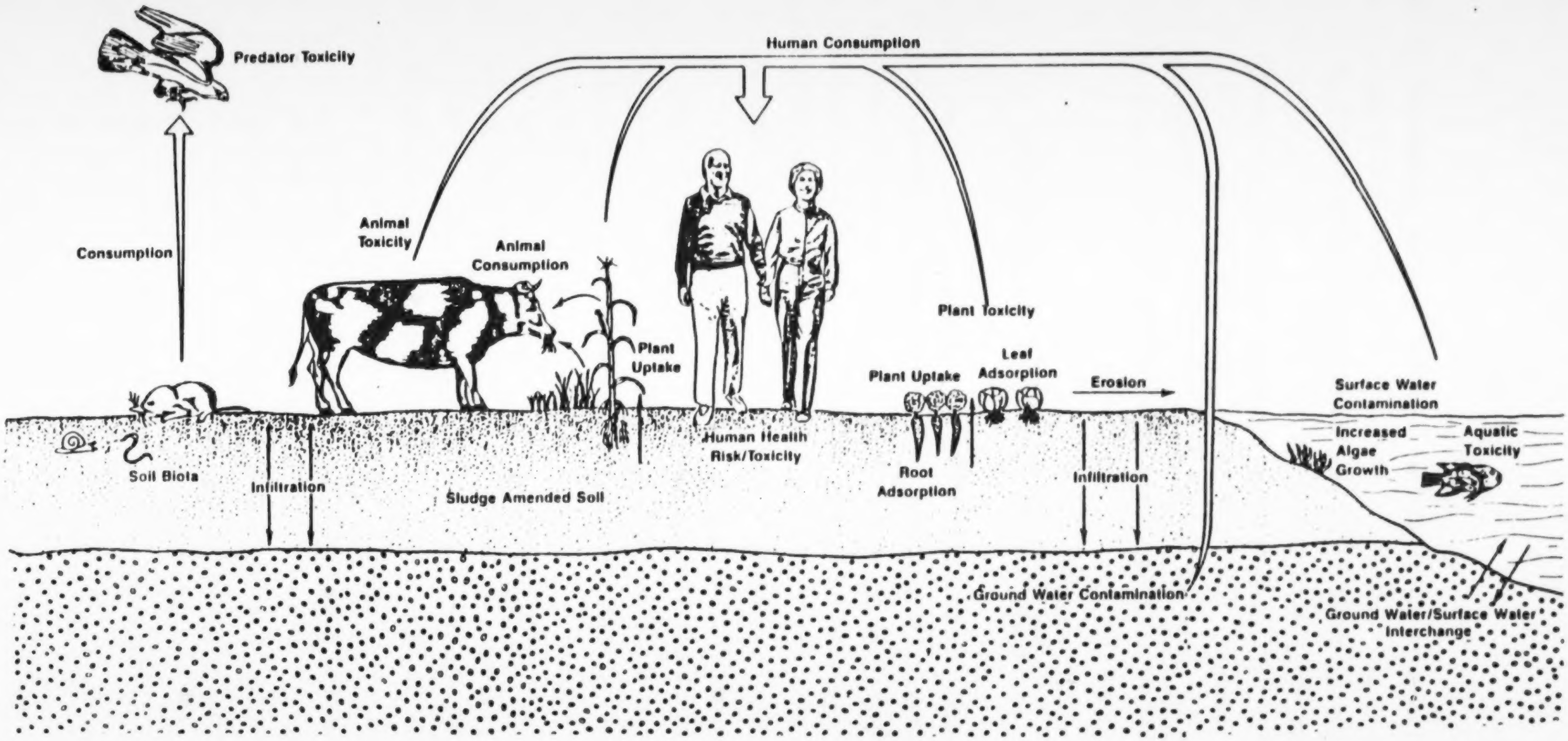
Predator Toxicity
Consumption
Human Consumption
Animal Toxicity
Animal Consumption
Plant Uptake
Plant Toxicity
Plant Uptake
Leaf Adsorption
Erosion
Surface Water Contamination
Increased Algae Growth
Aquatic Toxicity
Soil Biota
Infiltration
Sludge Amended Soil
Human Health Risk/Toxicity
Root Adsorption
Infiltration
Ground Water Contamination
Ground Water/Surface Water Interchange

Figure 1. Possible Pathways for Contaminant Transport in the Environment and Their Effects.

help to mitigate the potential for nutrient loss by surfacewater runoff. It is recommended that soil testing be performed at least annually to determine N and P levels. If levels that are unfavorable to the crop are found, the user may stop adding sludge temporarily.

Other potentially harmful chemical constituents include inorganic species such as molybdenum, selenium, arsenic, copper, lead, cadmium, nickel, zinc, mercury, chromium, and cobalt. Some of these elements are essential for plants as micronutrients. At high concentrations, however, the same elements can inhibit plant growth or yield. In some cases, these chemicals may not be detrimental to plants, but can have harmful effects on animals or humans that consume the plants or their parts. The availability of these metals for plant uptake depends in part on the soil chemistry, and is generally increased at low pH.

As described in the previous section, sewage sludge is one of the end-products in biological treatment of municipal wastewater. At times, these wastewaters contain low levels of toxic organic chemicals that are not readily decomposed by biological activity. Some of these compounds (e.g. pesticides) can end up in sludges and may subsequently affect the plants grown on sludge amended soils and/or pose a health risk to animals and humans.

Biological contaminants which potentially may be found in sludge include microorganisms that can cause diseases in humans and animals. These pathogenic organisms include bacteria, viruses, protozoa, and helminths. Pathogens in sludges are significantly reduced during sludge digestion, but are not totally eliminated. These organisms can attach to leafy and root vegetables. Consumption of these raw vegetables may expose humans to pathogenic organisms. Disease also could be transmitted to animals via pasture grown on sludge amended soils. The potential for surfacewater and groundwater contamination with pathogens also exists. However, the concentration of harmful microorganisms in sludges can be reduced to extremely low levels by disinfection or other treatment techniques, prior to release for land application.

Survival of pathogens contained in sludge after its application to land in an important consideration. Survival of pathogenic microorganisms is prolonged at low temperatures (below 5°C) whereas die-off is fairly rapid at higher temperatures. The survival times for common bacterial pathogens and viruses on crops are reported to be less than 2 months (U.S. EPA, 1983). The protozoan cysts and helminth eggs deposited on plant surfaces are expected to die off rapidly because of their exposure to sunlight and desiccation. According to an EPA report (U.S. EPA, 1983), there have not been any serious disease problems resulting from the application of stablized sludges on agricultural cropland. Requirements for pathogen reduction and guidelines for sludge application to crops to be eaten raw are presented in Table 2.

Despite these potential problems, sewage sludge has been used successfully in many land application systems. The keys to successful use in agriculture have been and will continue to be proper management, coupled with application rates that are based on the fertilizer needs and tolerance of the crop, instead of rates to maximize sludge disposal.

It is assumed in this manual that the sludge meets regulatory requirements as to the quantity of hazardous chemical compounds and quality with respect to biological contaminants. Agricultural sludge should have been tested and "certified fit for normal use on farms". The regulations pertinent to sludge quality and its application to agricultural land could be promulgated by federal, state, regional, county and municipal agencies. When the regulations are promulgated by more than one agency within the jurisdiction of concern, the most stringent rule must be followed by the user. A set of sludge application guidelines developed jointly by the Environmental Protection Agency (EPA), Food and Drug Administration (FDA), and the Department of Agriculture (USDA) are presented in Table 2.

GUIDE TO MANUAL USE

The following sections describe how the user can benefit most from this manual. Information a user must obtain is described first, along with a brief explanation of how the tables of recommended sludge application rates were developed. Next, the information that is built into the tables is described. The safety factors for long-term use of sewage sludge on agricultural land are described, followed by a brief example of how to use the application rate tables.

TABLE 2. A SUMMARY OF JOINT EPA/FDA/USDA GUIDELINES OF SLUDGE APPLICATION FOR FRUITS AND VEGETABLES PRODUCTION*

Annual and Cumulative Cadmium (Cd) Rates - Annual rate should not exceed 0.5 kg/ha. Cumulative Cd loadings should not exceed 5, 10, or 20 kg/ha, depending on soil pH and cation exchange capacity (CEC) values of <5, 5 to 15, and >15 meq/100 g, respectively.

Soil pH - Soil pH (plow zone - top 6 in) should be 6.5 or greater at time of each sludge application.

PCB's - Sludges with PCB concentrations greater than 10 mg/kg should be incorporated into the soil, as opposed to surface-applied.

Pathogen Reduction - Sludge should be treated by a pathogen reduction process before soil application. A waiting period of 12 to 18 months before a crop is grown may be required, depending on prior sludge processing and disinfection.

Use of High-Quality Sludge - High-quality sludge should not contain more than 25 mg/kg Cd, 1,000 mg/kg lead (Pb), and 10 mg/kg PCB (dry weight basis).

Cumulative Lead Application Rate - Cumulative Pb loading should not exceed 800 kg/ha.

Pathogenic Organisms - A minimum requirement is that crops to be eaten raw should not be planted in sludge-amended fields within 12 to 18 months after the last sludge application. Further assurance of safe and wholesome food products can be achieved by increasing the time interval to 36 months.

Physical Contamination and Filth - Sludge should be applied directly to soil and not directly to any human food crop. Crops grown for human consumption on sludge-amended fields should be processed with Good Food Industry Practices, especially for root crops and low-growing fresh fruits and vegetables.

Soil Monitoring - Soil monitoring should be performed on a regular basis, at least annually for pH. Every few years, soil tests should be run for Cd and Pb.

Choice of Crop Type - The growing of plants which do not accumulate heavy metals is encouraged.

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*U.S. EPA (1981), (in U.S. EPA, 1983)

Information Sludge User Must Obtain

Acquiring the information necessary to use this sludge manual is relatively simple. First, a sludge user in a specific state, or region of a state, will identify what crop or crop group he expects to grow in the sludge amended field, and the expected yield. The tables are organized by state and crop, and, depending upon rainfall intensity, sometimes by regions within a state (e.g. eastern, central, and western). Two crop yields are included in the tables because the amount of sludge to be applied varies with the expected yield. State average yields are listed first, followed by higher expected yields. It has been found that state average yields are approximately 70 percent lower than "theoretical maximum yields," so the tables include these higher yield goals for each state for farmers who wish to aim beyond the average yields.

A user should know whether the sludge to be applied is aerobically or anaerobically digested because the amount of available nitrogen varies with the type of sludge; these are the two most common sludges available. This information is available from the sludge supplier. A user should also know the approximate slope of the land to be treated with sludge because the amount of runoff may vary with the slope. The application tables include two slope ranges: 0 to 3 percent, and 3 to 6 percent. The method of application must also be determined. The tables provide recommended rates of application for incorporated and surface-applied sludge; incorporated sludge implies all forms of incorporation, and surface-applied sludge implies no deliberate incorporation into the soil.

The user must also know the general texture of the soil to be treated with sludge because nitrogen availability from sludge varies with soil texture. Thus, the recommended rates in the tables vary depending on whether the soil is coarse, medium, or fine-textured. As explained in a later section, these correspond to sandy-loam, loam, and silty-clay soils, respectively. The rationale for these various assumptions and a technical discussion of the model used to calculate sludge application rates is explained in more detail later.

Basis for the Approach

The annual sludge application rate is based on the nitrogen requirements for a specific crop because nitrogen is the major plant nutrient available in sludge. Once a crop is selected, its nitrogen requirements for the average and theoretical maximum yields are incorporated in the method used for calculating application rates. The actual nitrogen availability from sludge varies considerably depending on the type of sludge (see Table 1), the soil type, the method of application, and the rate at which organic nitrogen in sludge is converted to plant-available nitrogen. Therefore, the plant-available nitrogen in sludge is factored into the calculation of the amount of sludge required to supply the nitrogen needs of the crop.

Nitrogen is considered the limiting factor for initial recommendations of sewage sludge application, whereas the potential for phosphorus runoff to surfacewaters ultimately limits the total area that may receive surface-applied sludge. Soils adsorb phosphorus and will minimize phosphorus runoff to surfacewaters when sewage sludge is land-applied. However, in some situations, for example, during an intense rainfall following surface application, excessive erosion could result from mass movement of sludge to surface waters. To avoid excessive erosion, the model estimates the potential phosphorus runoff that could occur following sludge application. This depends on the state or region within a state (due to variations in rainfall intensity), soil/sludge erosion potential (due to differences in soil texture and methods of sludge application), slope, crop (row crops versus drilled crops), and watershed area. In cases where phosphorus runoff is not expected to be a problem, the recommended application rate is based strictly on nitrogen requirements, as explained earlier. However, in cases where widespread surface-application of sludge could result in excessive phosphorus runoff, the majority of the watershed should be used for incorporated application.

Safety Factors for Long-Term Use

If managed properly, sewage sludge application has the potential to offset a portion of fertilizer costs and improve soil structure over the long term. The model used in this manual is intentionally conservative, as far as recommended application rates, in an effort to make sludge application a long-term (many years) management option.

Present practices in sludge application can be classified as disposal, high-rate fertilization, and low-rate fertilization (Schwing and Puntenney, 1974). Under the disposal system, which is essentially a dedicated landfill site, as many as several hundred tons per acre per year may be applied. Under high rate fertilization, annual rates of up to 75 dry tons per acre are common, the primary purpose of which is to maximize the amount of organic materials applied. However, accumulation of salts and heavy metals may impair the soil and decrease the longevity of the site for sludge application.

By contrast, the primary objective of the low-rate fertilization system is to maximize crop production, maintain soil stability, and avoid build-up of metals and salts. The low-rate fertilization system is the approach taken in this manual. The key feature is the balance between nutrients added through sludge and those removed by the crop. A conservative limit of 10 dry tons/acre/1 year or less has been recommended in the low-rate fertilization system, depending on soil characteristics and crop requirements (Schwing and Puntenney, 1974; Manson and Merritt, 1975).

The major nutrient available in sludge is nitrogen, which occurs as ammonia, nitrate or organic nitrogen. However, the rate at which nitrogen from sludge becomes available varies considerably and is one of the factors incorporated in the model as described in a later section. Organic nitrogen in sludge becomes available to crops at a fairly predictable rate (Schwing and Puntenney, 1974). However, some ammonia nitrogen will volatilize depending on the type of soil and the type of application, while nitrate-nitrogen is considered almost totally available. The amount of sludge-applied nitrogen necessary to meet the demands of the crop changes each year because of the slow release of mineral nitrogen from the organic nitrogen of sludge applied previously. In the first year of application, only a portion of the sludge nitrogen is available; the remainder is carried over to subsequent years. Therefore, in the second year, not as much sludge is required as in the first year because of the carry-over nitrogen. This is the case through five years of application. After the fifth year of sludge application, the mineralization of organic nitrogen from sludge applied in previous years has little fertilizer effect on crops, and equilibrium is reached. Therefore, sludge rates recommended in this manual are based on the fifth-year application rate. During the first four years of sludge use, a farmer may find it necessary to supplementally fertilize with inorganic nitrogen to meet the demands of the crop. This should be monitored through annual soil testing.

The addition of N to soils in excess of crop needs results in the potential for NO_3^- contamination of groundwater. In the approach used in this manual, because the amount of plant available N applied to soils in sewage sludge is consistent with state fertilizer recommendations for the crop, the potential for NO_3^- contamination should be no greater than that caused by conventional N fertilizers (U.S. EPA, 1983).

Another factor to consider for long-term use of sewage sludge is the potential for surface runoff. This is most likely in areas of high rainfall intensity and surface-applied sludge. Even though rainfall intensity has been incorporated in the tables of sludge application rates, Appendix B shows the monthly variation in rainfall intensities for selected states for information purposes. The model used for predicting sludge application rates also has a built-in safety factor based on the potential for phosphorus runoff from sludge. Since heavy rainfall can cause significant surface erosion, sludge applied over the land with the intention of incorporation into soils should be incorporated within 24 hours of spreading. In addition, there are other established criteria relevant to sludge runoff that should be followed. For example, it is recommended that sludge should not be applied closer than approximately 150 feet to wells used for potable water and approximately 200 feet to surfacewaters (Illinois EPA, 1984). On frozen, sloped ground not covered with snow or ice, sludge should not be applied unless a grassy buffer of approximately 200 feet width lies between the sludge site and any potable or surfacewater supply; sludge application on ice or snow covered ground is not recommended. Whenever sludge is applied, normal farming practices to control erosion should be followed, for example, contour farming, terracing, sod waterway construction, and vegetative fence rows.

Other safety factors for long-term use should also be considered. For example, although the accumulation of toxic metals is not expected to be a problem with certified sludge and because of the conservative rates of application recommended in this manual, the potential for metal availability can be minimized further by maintenance of soil pH at 6.5 or greater. For surface-applied sludge on pastures and forages, it is recommended that sufficient time be allowed for incorporation of the sludge into the soil prior to harvesting or grazing. The time necessary will vary but should be approximately 1 month unless sufficient rainfall occurs to wash the sludge from the plant leaves. Finally, it is recommended that sludge be incorporated into the soil whenever possible instead of being applied to the surface. Surface application should not occur closer than approximately 200 feet to dwellings or approximately 20 feet from roadways. For incorporated sludge, these distances change to 20 and 10 feet, respectively (Illinois EPA, 1984).

Example of Manual Use

This manual is designed to be a handbook for the application of sewage sludges to cropland and orchards. It is relatively simple in format, with tables of recommended application rates organized according to state and crop.

To use the manual, first turn to the appendices, which contains Appendix A, B, C, and D. Find the section of Appendix C which corresponds to the state of interest. The states are arranged alphabetically. In some cases, it will be necessary to identify a specific region within a state, because of variations in rainfall intensities. Differences in rainfall intensities influence how much sludge can be applied before the potential for sludge runoff becomes limiting. The crops in each state are also arranged alphabetically. After locating the correct state and crops determine whether aerobic or anaerobic sludge is to be applied, and whether it is to be incorporated or surface-applied. Then determine the soil type and the slope of the field where the application will occur and find the corresponding value for dry tons of sewage sludge per acre. To determine sludge application on a wet-weight basis, divide the dry weight values by the total solids fraction in the sludge, which should be obtained from the sludge supplier.

For example, suppose a user in Arkansas wishes to incorporate anaerobically digested sewage sludge into land planned for corn production. According to the tables, the state average yield for corn in Arkansas is 90 bushels/acre. If the soil type is a medium soil with a slope less than 3 percent, 3.3 dry tons/acre should be applied. On the other hand, if the aim is for the higher yield of 129 bushels/acre, 4.7 dry tons/acre should be applied. If this is the first through the fourth years of sludge application, supplemental nitrogen fertilization may be necessary to satisfy the demands of the crop. However, if this is the fifth or later year of application, the nitrogen demands of the crop should be met by the applied and residual sludge. The user would still need to soil-test to monitor for potential deficiencies in potassium, because of its relatively low level in sludge.

Suppose, however, that the same user wished to surface-apply anaerobically digested sludge on medium-texture soil that has a slope of 3 to 6 percent. To obtain 129 bushels/acre in the fifth year of sludge application, 6.1 dry tons/acre of sewage sludge would need to be applied. The higher recommended rates for surface-applied compared to incorporated application is necessary to account for potential runoff, while still meeting the nitrogen demands of the crop. However, caution is necessary because too much surface-application in a given watershed can result in excessive runoff. While most of the land may receive incorporated sludge, only a fraction of the acreage in a watershed may receive surface-applied sludge. In the case of Arkansas, which receives substantial rainfall, only 1 percent of the land with slopes of 3 to 6 percent in a watershed may be amended with surface-applied sludge (see Table 8). Similarly, only 2 percent of land with slopes of 0 to 3 percent in a watershed may be amended with surface-applied sludge. However, the remaining land in the watershed may receive incorporated sludge.

The conservative nature of the model allows for crop rotation. For example, if a farmer in Ohio plants wheat (sludge application rate 2.2 t/acre) in the first year and corn (application rate 5.5 t/acre) in the second year, the application rate is still conservative because there is minimal carryover of organic-N from the first year since the first-year crop was wheat. If in the third year wheat is grown again, the carryover of organic-N from the previous year (corn) is a little more than calculated for wheat, but because the calculated rate for wheat is a fifth-year equilibrium rate, the additional organic-N will only go towards fulfilling plant requirement. Thus, the farmer may apply sludge in each year of application, at a rate governed only by the crop grown that year.

More site-specific calculations can be done by using the calculations shown in Appendix A. For instance, if dewatered or liquid sludges are used, the concentrations of N and P of these sludges could be used instead of concentrations of N and P found in aerobic and anaerobic sludges. If crops other than those covered in this manual are used, the desired yield, N fertilizer requirements, and crop cover factors for these crops could be used in the calculations.

INTRODUCTION TO METHODS USED TO CALCULATE APPLICATION RATES

This part of the manual describes the methods used to calculate sludge application rates on various croplands and orchards in various states. The first two sections identify the variables used in the method and present the rationale for their use. Next, the model output was compared to literature field values. The methods of the literature search are provided as well as the favorable results of the data comparison.

VARIABLE SELECTION ASSUMPTIONS

The sludge application model calculates an annual recommended sludge application rate based on the nitrogen requirement of the crop to be grown (Table 3). The model considers crop yield, rainfall, surface runoff (especially with regard to phosphorus pollution potential), slope of the land, soil type, type of application, and sludge type. Heavy metal loading is not considered because of the conservative nature of the recommended rates, but may have a bearing on the life of a site. Figure 2 shows a schematic diagram of the model. Starting at the top the user follows the questions and options

TABLE 3. ANNUAL TOTAL NITROGEN REQUIREMENTS FOR CROPS(a)

Group	N-requirement	Crop-Cover Factor(b)
Apples	1 lb N/Tree	0.225
Barley	1.8 lb N/bu	0.285
Citrus fruits	137 lb/acre	0.225
Corn	1.3 lb N/bu	0.400
Cotton	0.0875 lb N/lb	0.400
Forages	4.0 lb N/ton	0.263
Grapes, vineyards	54 lb/acre	0.225
Horticulture	120 lb/acre	0.225
Oats	0.9 lb N/bu	0.285
Peach, Nectarine, Cherry, Plum	0.75 lb N/tree	0.225
Pear	0.38 lb N/tree	0.225
Rice	0.0175 lb N/lb	0.285
Rye	1.1 lb N/bu	0.285
Sorghum	1.2 lb N/bu	0.400
Soybean	4.1 lb N/bu	0.375
Sunflower	0.045 lb N/lb	0.400
Tree farming	200 lb/acre	0.225
Wheat	1.2 lb N/bu	0.285

(a) Assumed constant for the same crop, independent of state

(b) Means the ground cover protection factor against erosion

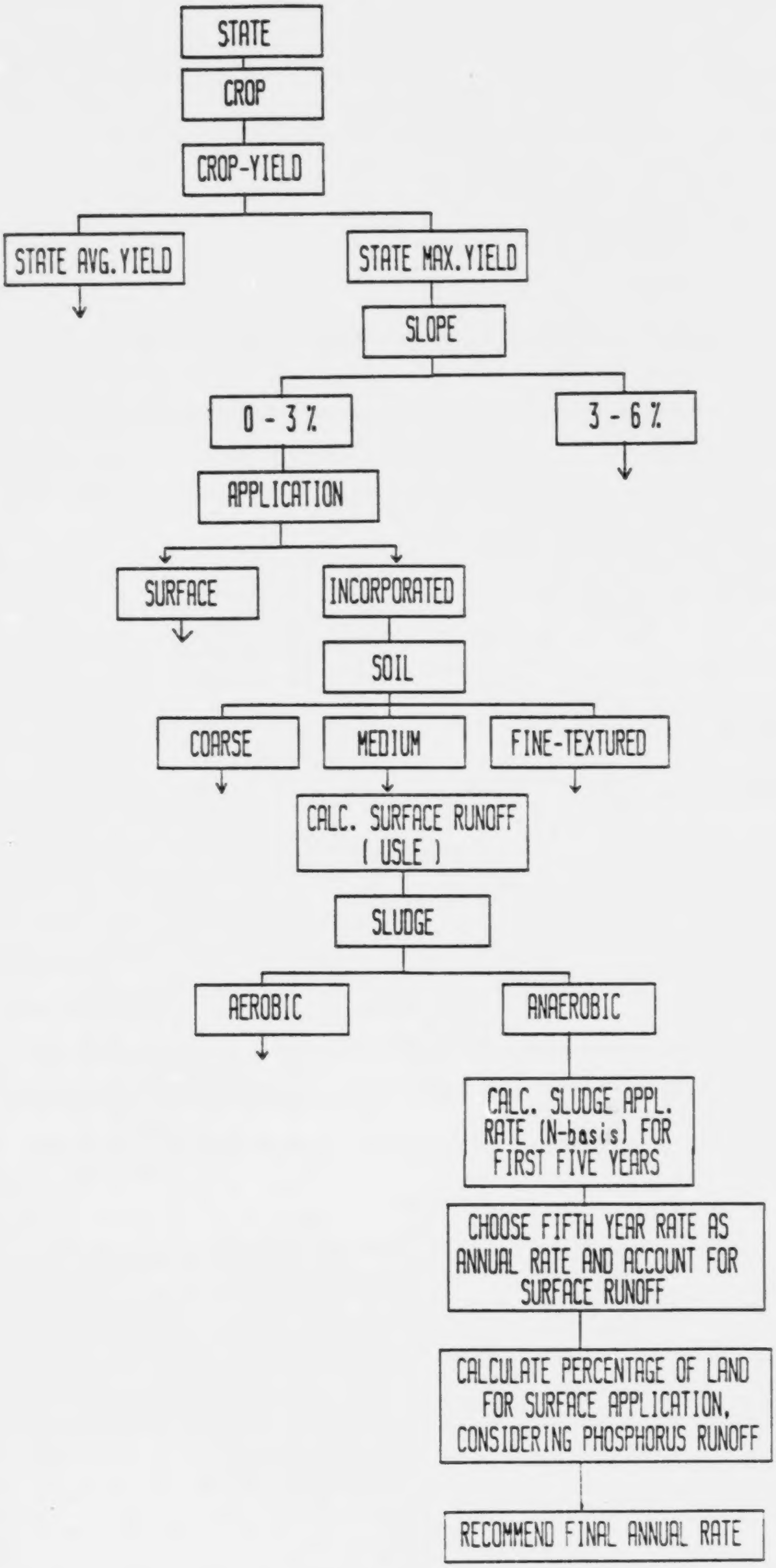
STATE
CROP
CROP-YIELD
STATE AVG. YIELD
STATE MAX. YIELD
SLOPE
0 - 3 %
3 - 6 %
APPLICATION
SURFACE
INCORPORATED
SOIL
COARSE
MEDIUM
FINE-TEXTURED
CALC. SURFACE RUNOFF (USLE)
SLUDGE
AEROBIC
ANAEROBIC
CALC. SLUDGE APPL. RATE (N-basis) FOR FIRST FIVE YEARS
CHOOSE FIFTH YEAR RATE AS ANNUAL RATE AND ACCOUNT FOR SURFACE RUNOFF
CALCULATE PERCENTAGE OF LAND FOR SURFACE APPLICATION, CONSIDERING PHOSPHORUS RUNOFF
RECOMMEND FINAL ANNUAL RATE

Figure 2. Method for Calculating Sludge Application.

through several steps. The open arrows indicate that a similar sequence of blocks follows the arrow as the sequence after the adjoining block.

The top-ten crops in the United States (Table 4) were considered first for sludge application. This was later expanded to include numerous other crops. The states in which major crops are grown are also considered (Tables 5). The rainfall intensity for each state was determined as given by a rainfall erosivity factor, R, which has been compiled for the Universal Soil Loss Equation (USLE) (Table 6). The R factor is a measure of the erosive force of specific rainfall events and is the sum of the kinetic energy times the maximum 30-minute intensity for each storm during the year. Use of the R factor was deemed more appropriate than simply considering annual rainfall or precipitation, because it accounts for storm intensity, which is critical for estimating sludge application rates. Up to three R factors occur for some states, depending on the variation in rainfall intensity.

The crops to be grown are specified next. The state average yields were determined from U.S. Department of Agriculture statistics. The state theoretical maximum yields were calculated so that the average yields are 70% of the maximum yields. If his typical yield is below the state average, the user can aim at the average yield and apply sludge accordingly. If his expected yield is above the state average, aim may be for the maximum yield.

Two conditions--0 to 3 percent and 3 to 6 percent--for slope of the land have been selected for the model; sludge application on slopes greater than 6% is not recommended because of the potential for excessive runoff. Two types of application--surface and incorporated--have been considered for model inclusion. Incorporated application is assumed to include all forms of incorporation, including injection, plowing, discing, and rototilling. Soil types used in the model are coarse, medium and fine-textured, which have cation exchange capacities (CEC) of roughly 0-5, 5-15, and >15 meq/100 g and correspond roughly to a sandy-loam, loam, and silty-clay loam.

At this point the potential surface runoff can be calculated using the USLE,

$$Y = R \times K \times LS \times C \times P \times S_d$$

where

Y = sediment loading from surface erosion, tons/acre

TABLE 4. TOP TEN CROPS IN THE UNITED STATES (X 10^6 ACRES)[a]

		1983	1982	1981	1980	1979
1.	Wheat (AP)[b]	76.4	86.2	88.2	80.8	71.4
2.	Soybeans (AP)	61.1	70.9	67.5	69.9	71.4
3.	Corn (AP)	60.2	81.8	84.1	84.0	81.4
4.	Oats (AP)	20.3	14.0	13.6	13.4	14.0
5.	Sorghum (AP)	11.7	16.0	15.9	15.6	15.3
6.	Barley (AP)	10.4	9.5	9.6	8.3	8.1
7.	Cotton (AH)[c]	7.9	11.3	14.3	14.5	14.0
8.	Sunflower (AP)	3.1	4.8	3.9	3.9	5.6
9.	Rice (AP)	3.2	3.3	3.8	3.4	2.9
10.	Rye (AP)	2.7	2.5	2.6	2.5	2.8

(a) Adapted from USDA, 1984; includes all states

(b) AP = Acres planted

(c) AH = Acres harvested

TABLE 5. AVERAGE YEARLY CROP ACREAGE IN MAJOR CROP-PRODUCING STATES (1981-1983) (1000 ACRES)(a) (b)

State	Barley	Corn	Cotton	Forages	Oats	Rice	Rye	Sorghum	Soybeans	Sunflower	Wheat
Arkansas	---(c)	48	640	890	15	1300	---	320	4200	---	1800
California	670	190	1300	1510	320	490	---	80	---	---	1130
Connecticut	---	50	---	870	---	---	---	---	---	---	---
Florida	---	30	200	264	---	---	---	---	400	---	---
Georgia	---	1100	220	490	160	--	430	180	2300	---	1300
Illinois	---	10500	---	11300	1000	---	600	140	9100	---	1700
Indiana	---	5900	---	780	220	---	40	20	4300	---	1200
Iowa	---	12400	---	2200	2400	---	20	30	8100	---	750
Kansas	80	1100	0.6	2300	150	---	550	1600	1600	---	13900
Louisiana	---	60	860	360	---	550	---	160	2800	---	430
Maryland	100	100	---	2230	20	---	70	---	40	---	140
Massachusetts	---	400	---	120	---	---	---	---	---	---	---
Minnesota	1000	67	---	2100	2000	---	140	---	4700	430	3000
Mississippi	---	140	480	700	---	250	---	180	3500	---	810
Missouri	---	2000	220	3300	140	70	40	870	5300	---	26000
Montana	1700	77	---	2300	230	---	---	---	---	---	5500
Nebraska	5	6700	---	3700	590	---	88	1800	2100	---	2900
New Jersey	30	30	---	112	5	---	80	---	160	---	6
New York	---	610	---	2290	300	---	100	---	---	---	160
North Dakota	2300	840	---	2900	130	---	980	---	540	2700	9900
Ohio	---	3800	---	1300	400	---	800	---	3500	---	1400
Oklahoma	40	80	610	1820	200	---	190	600	280	---	790
Oregon	250	30	---	1080	130	---	31	---	---	---	1260
Pennsylvania	80	1800	---	5900	350	---	60	---	140	---	230
South Dakota	600	3100	---	4100	2200	---	180	490	950	570	3300
Texas	70	1200	7300	3000	1400	460	150	4800	670	180	8000
Virginia	120	800	0.5	1008	48	---	160	20	670	---	410
Washington	840	50	---	812	70	---	---	---	---	---	3050
Wisconsin	40	4000	---	3600	1100	---	40	---	430	---	140

(a) Adapted from USDA, 1984.

(b) Fruit crops are not included in these data

(c) --- indicates not a major crop in a particular state

TABLE 6. RAINFALL EROSIVITY FACTORS (R)[a]

State	Rainfall Erosivity Factor
Arizona	50
Arkansas	325
California	35
Colorado (East)	75
Connecticut	200
Delaware	200
Florida	350
Georgia	325
Hawaii	400
Idaho	20
Illinois	200
Indiana	175
Iowa	175
Kansas (East)	200
(West)	120
Louisiana	350
Maryland	150
Massachusetts	150
Michigan (South)	125
Minnesota	125
Mississippi	350
Missouri	225
Montana	35
Nebraska	100
New Jersey	200
New York	125
North Carolina	250
North Dakota	75
Ohio	150
Oklahoma (East)	250
(Central)	200
(West)	150
Oregon	35
Pennsylvania	125
South Dakota	80
Texas (East)	350
(Central)	225
(West)	100
Utah (East)	20
Virginia	200
Washington	35
Wisconsin	125

(a) Adapted from U.S. EPA, 1976b; values were taken from a map of rainfall erosivity factors.

R = the average rainfall factor, expressing the erosion potential of average annual rainfall in the locality; it is a summation of the individual storm products of the kinetic energy of rainfall, in hundreds of foot-tons per acre, and the maximum 30-min rainfall intensity, in inches per hour, for all significant storms, on an average annual basis

K = the soil-erodibility factor, commonly expressed in tons per acre per R unit

L = the slope-length factor, dimensionless ratio

S = the slope-steepness factor, dimensionless ratio

C = the cover factor, dimensioness ratio

P = the erosion control practice factor, dimensionless ratio

S_d = the sediment delivery ratio, dimensionless

Variation of rainfall erosivity factor (R) is given in Table 6. The soil erodibility (K) is in dry tons/acre/unit R and varies from 0.12 to 0.7 tons/acre/R (U.S. EPA, 1976a). A loamy soil of moderate permeability has a value for K approximately midrange between 0.12 and 0.07 ton/acre/R. Because of the relatively loamy nature of sludge, leading to moderate permeability, a value of 0.3 tons/acre/R is assumed for surface application of sludge. However, for incorporated application in coarse, medium, and fine-textured soil, values of 0.12, 0.18, and 0.23 tons/acre/R, respectively, are assumed due to the dominance of the soil. That is, in incorporated application, the assumption was made that only 1 percent of the potential runoff is sludge, as compared to approximately 50 percent for surface-applied sludge. Therefore, the lower K values for incorporated sludge imply that most of the runoff is soil. The LS factor, which accounts for the slope length and steepenss effect, is based on the length and slope of a 100 ft. length plot. A value of 0.2 is assumed for 0 to 3% slope and a value of 0.7 is assumed for 3 to 6% slope (U.S. EPA, 1976b).

The C factor (Table 7) accounts for the relative protection of ground covers against erosion. For small grains such as rye, wheat, barley and oats a value of 0.285 is assumed. For soybeans the value is 0.375, while for row crops like cotton, tobacco, corn and sorghum, the value is 0.40. The practice

TABLE 7. RELATIVE PROTECTION OF GROUND COVER AGAINST EROSION (in order of increasing C factor)[a]

Land-Use Groups	Examples	Range of "C" Values	Value Used[b]
Permanent vegetation	Protected woodland Prairie Permanent pasture Sodded orchard Permanent meadow	0.0001-0.45	0.225
Established meadows	Alfalfa Clover Fescue	0.004-0.3	0.152
Small grains	Rye Wheat Barley Oats	0.07-0.5	0.285
Large-seeded legumes	Soybeans Cowpeas Peanuts Field peas	0.1-0.65	0.375
Row crops	Cotton Potatoes Tobacco Vegetables Corn Sorghum	0.1-0.70	0.40
Fallow	Summer fallow period between plowing and growth of crop	1.0	1.0

[a] Adapted from U.S. EPA, 1976b; the C factor is the ratio of soil loss from a field with specified cropping and management practices to that from the fallow condition

[b] The value used is an approximate midrange value that was deemed most appropriate relative to the crops being considered in this manual.

factor, P, is the ratio of soil loss with contouring, strip-cropping, or terracing, to the soil loss from straight-row farming up and down slopes. The P values are assumed to be 0.75 for 0 to 3 percent slope (cross-slope farming without strips) and 0.37 for 3 to 6 percent slope (contour farming, cross-slope farming with strips) (U.S. EPA, 1976b).

The sediment-delivery ratio, S_d, accounts for the fraction of the gross erosion in a watershed that is delivered to a stream. For a second-order stream having a drainage area of 3000 acres (4.7 sq miles) and an average length of 2.1 miles (representative parameters assumed in this method in order to calculate potential runoff) (Keup, 1985) the S_d is 0.45. This means that approximately 45% of the total eroded material in runoff may potentially reach the stream.

Next, the type of sludge being used is specified as anaerobic or aerobic. The following composition is assumed to remain constant (U.S. EPA, 1983):

	Anaerobic	Aerobic
Total-N, percent	5.0	4.9
Ammonia-N, mg/kg	9,400	950
Nitrate-N, mg/kg	520	300

The remainder of the total-N is organic-N.

The amount of sludge required in the first year to supply the plant requirements of nitrogen is then calculated for both the state average and the maximum yields. Each crop is assumed to have a constant N-requirement per unit of yield. The plant-available nitrogen (PAN) in the sludge is estimated as follows:

1. Ammonia-N availability

	soil		
	Coarse	Medium	Fine-Textured
Surface Application	50%	50%	50%
Incorporated Application	50%	80%	85%

2. Organic-N availability

   20 percent of the organic-N applied in the first year, is available immediately; in the second, third, fourth and fifth year after application, 10, 5, 2.5 and 1.25 percent, respectively, of the residue from the first year is assumed to be available.

3. Nitrate-N availability

   100 percent of the nitrate-N is assumed to be available.

Thus, the amount of sludge required in each following year decreases as organic-N from previous years becomes available. After the fifth year, additional organic nitrogen is not available to the crops from sludge that was applied 5 or more years ago. An equilibrium situation is thus reached in the fifth year. Hence, the fifth year rate can be taken as a conservative rate of sludge application for all the five years and for all following years. The remaining nitrogen requirement in the first 4 years can be made up with fertilizers. This ensures maximum long-term utilization of both sludge as well as land. If metals need to be taken into account, this conservative approach may also extend the life of the site by preventing heavy metal accumulation in the soil.

Many sludges may contain appreciable phosphorus concentrations and applying sludges at a rate to provide all the nitrogen needed by a crop (particularly for corn) could add more phosphorus than is required by the crop. Therefore, it is important for the farmer to monitor soil phosphorus by annual soil fertility tests. Generally P accumulates in the soil and is available in future years. If soil P reaches maximum levels allowed by state environmental regulations, then annual sludge applications will have to be reduced or terminated for a period of time. By taking a conservative approach to sludge application, problems due to excessive phosphorus should be minimized.

Some sludge could be lost due to surface runoff, especially where it is surface-applied in a state of moderate or high rainfall intensity, such as Louisiana. Good soil management practices should be implemented to prevent excessive runoffs. The assumption is made that up to 25 percent of the annual sludge runoff may be made up by additional sludge. This is because the sludge is assumed to be available for runoff only during approximately 25 percent of the year, due to surface-applied sludge incorporation into the soil as a result of farming operations, reducing its erosion potential. Hence, a recommended rate is the fifth year application rate plus 25 percent of the annual surface sludge runoff as calculated by the USLE.

An additional consideration concerns phosphorus pollution potential (Figure 2). Sludge that runs off to surfacewater contains phosphorus, which in excessive amounts may cause eutrophication. The phosphate-phosphorus limit for streams is 100 μg/liter to prevent growth of nuisance aquatic organisms (eutrophication) (U.S. EPA, 1976a). Because relatively uncontaminated surfacewaters contain from 10 to 30 μg/liter phosphate-phosphorus, no more than 70 μg/liter of additional phosphate-phosphorus may be added to surfacewaters due to sludge application and fertilization. The potential for phosphorus runoff from sludge for the typical watershed assumed earlier has been incorporated in the sludge calculations. First, the sludge runoff from an acre of land of the watershed was calculated using the USLE. Of the soluble phosphorus in land-applied sludge, approximately 50 percent was conservatively assumed to be fixed and adsorbed by the soil (in reality, greater than 50 percent of the soluble phosphorus applied as sludge is probably adsorbed by the soil). The remaining soluble phosphorus presumably may reach the stream. One-fourth of the total acreage of the watershed was assumed to have slopes conducive to excessive surface runoff, so the potential phosphorus runoff from 1 acre was multiplied by 25 percent of the total watershed acreage. For a second-order stream (typical of U.S. streams) at an average flowrate, the amount of sludge runoff required to provide 70 μg additional phosphate-phosphorus per liter in the stream was calculated. Knowing the maximum permissible sludge runoff, and assuming further that up to approximately 80 percent of the land in the watershed might be used for sludge application, the actual percentage of a given 3000 acre watershed that may be used for surface-applied sludge was calculated. The results for the states of interest are given in Table 8. The remaining agricultural land in the watershed may be used for incorporated application of sewage sludge.

TABLE 8. PERCENTAGE OF A WATERSHED THAT MAY RECEIVE SURFACE-APPLIED SLUDGE

State	Crop	Apples		Barley		Citrus		Corn		Cotton		Forages		Grapes, Vineyards		Horticulture		Oats	
	Slope	0-3%	3-6%	0-3%	3-6%	0-3%	3-6%	0-3%	3-6%	0-3%	3-6%	0-3%	3-6%	0-3%	3-6%	0-3%	3-6%	0-3%	3-6%
Arizona		36	20	28	16	36	20	19	11	19	11	30	17	36	20	36	20	--	--
Arkansas		4	2	--	--	--	--	2	1	2	1	4	2	4	2	4	2	3	1
California		51	29	40	23	51	29	28	16	28	16	44	25	51	29	51	29	40	23
Colorado		23	13	18	10	--	--	13	7	--	--	20	11	--	--	23	13	18	10
Connecticut		11	6	--	--	--	--	--	--	--	--	9	5	--	--	11	6	--	--
Delaware		8	4	6	3	--	--	4	2	--	--	7	3	--	--	8	4	--	--
Florida		--	--	--	--	4	2	2	<1	2	<1	3	1	--	--	4	2	--	--
Georgia		4	2	--	--	--	--	2	1	2	1	4	2	--	--	4	2	3	1
Idaho		91	52	71	41	--	--	51	29	--	--	77	44	--	--	91	52	71	41
Illinois		8	4	--	--	--	--	4	2	--	--	7	3	--	--	8	4	6	3
Indiana		9	5	--	--	--	--	5	2	--	--	8	4	--	--	9	5	7	4
Iowa		9	5	--	--	--	--	5	2	--	--	8	4	--	--	9	5	7	4
Kansas (east)		8	4	6	3	--	--	4	2	4	2	7	3	--	--	8	4	6	3
Kansas (west)		14	8	11	6	--	--	7	4	7	4	12	6	--	--	14	8	11	6
Louisiana		--	--	--	--	--	--	2	<1	2	<1	3	1	--	--	4	2	--	--
Maryland		8	4	6	3	--	--	4	2	--	--	7	3	--	--	8	4	6	3
Massachusetts		11	6	--	--	--	--	--	--	--	--	9	5	--	--	11	6	--	--
Michigan (south)		13	7	10	5	--	--	7	4	--	--	11	6	13	7	13	7	10	5
Minnesota		13	7	10	5	--	--	7	4	--	--	11	6	--	--	13	7	10	5
Mississippi		--	--	--	--	--	--	2	<1	2	<1	3	1	--	--	4	2	--	--
Missouri		7	3	--	--	--	--	3	1	3	1	6	3	--	--	7	3	5	2
Montana		--	--	40	23	--	--	28	16	--	--	44	25	--	--	51	29	40	23
Nebraska		--	--	13	7	--	--	9	5	--	--	14	8	--	--	17	9	13	7
New Jersey		11	6	8	4	--	--	6	3	--	--	9	5	--	--	11	6	8	4
New York		17	9	--	--	--	--	9	5	--	--	14	8	17	9	17	9	13	7
North Carolina		6	3	5	2	--	--	3	1	3	1	5	2	--	--	6	3	5	2
North Dakota		--	--	18	10	--	--	13	7	--	--	20	11	--	--	23	13	18	10
Ohio		11	6	--	--	--	--	6	3	--	--	9	5	11	6	11	6	--	--
Oklahoma (east)		--	--	4	2	--	--	2	1	2	1	4	2	--	--	5	2	4	2
Oklahoma (central)		--	--	6	3	--	--	4	2	4	2	7	3	--	--	8	4	6	3
Oklahoma (western)		--	--	8	4	--	--	6	3	6	3	9	5	--	--	11	6	8	4
Oregon		60	34	47	27	--	--	33	19	--	--	51	29	--	--	60	34	47	27
Pennsylvania		13	7	10	5	--	--	7	4	--	--	11	6	13	7	3	7	10	5
South Dakota		--	--	17	9	--	--	12	6	--	--	18	10	--	--	22	12	17	9
Texas (east)		--	--	3	1	4	2	2	<1	2	<1	3	1	--	--	4	2	3	1
Texas (central)		--	--	5	2	7	3	3	1	3	1	6	3	--	--	7	3	5	2
Texas (west)		--	--	13	7	17	9	9	5	9	5	14	8	--	--	17	9	--	--
Utah		91	52	71	41	--	--	51	29	--	--	77	44	--	--	91	52	71	41
Virginia		8	4	6	3	--	--	4	2	4	2	7	3	--	--	8	4	6	3
Washington		60	34	47	27	--	--	33	19	--	--	51	29	--	--	60	34	47	27
Wisconsin		13	7	10	5	--	--	7	4	--	--	11	6	--	--	13	7	10	5

TABLE 8. PERCENTAGE OF A WATERSHED THAT MAY RECEIVE SURFACE-APPLIED SLUDGE (Continued)

State	Crop / Slope	Peach, nect., cherry, plum 0-3%	Peach, nect., cherry, plum 3-6%	Pears 0-3%	Pears 3-6%	Rice 0-3%	Rice 3-6%	Rye 0-3%	Rye 3-6%	Sorghum 0-3%	Sorghum 3-6%	Soybeans 0-3%	Soybeans 3-6%	Sunflowers 0-3%	Sunflowers 3-6%	Wheat 0-3%	Wheat 3-6%
Arizona		--	--	--	--	--	--	--	--	19	11	--	--	--	--	28	16
Arkansas		4	2	--	--	3	1	--	--	2	1	2	1	--	--	3	1
California		51	29	51	29	40	23	--	--	28	16	--	--	--	--	40	23
Colorado		23	13	--	--	--	--	--	--	13	7	--	--	--	--	18	10
Connecticut		11	6	11	6	--	--	--	--	--	--	--	--	--	--	--	--
Delaware		8	4	--	--	--	--	6	3	--	--	4	2	--	--	6	3
Florida		--	--	--	--	--	--	--	--	--	--	2	1	--	--	--	--
Georgia		4	2	--	--	--	--	3	1	2	1	2	1	--	--	3	1
Idaho		91	52	--	--	--	--	--	--	--	--	--	--	--	--	71	41
Illinois		8	4	--	--	--	--	6	3	4	2	4	2	--	--	6	3
Indiana		9	5	--	--	--	--	7	4	5	2	5	2	--	--	7	4
Iowa		--	--	--	--	--	--	7	4	5	2	5	2	--	--	7	4
Kansas (east)		8	4	--	--	--	--	6	3	4	2	4	2	--	--	3	6
Kansas (west)		14	8	--	--	--	--	11	6	7	4	8	4	--	--	11	6
Louisiana		4	2	--	--	3	1	--	--	2	<1	2	1	--	--	3	1
Maryland		8	4	--	--	--	--	6	3	--	--	4	2	--	--	6	3
Massachusetts		11	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Michigan (south)		13	7	--	--	--	--	--	--	--	--	8	4	--	--	10	5
Minnesota		--	--	--	--	--	--	10	5	--	--	8	4	7	4	10	5
Mississippi		4	2	--	--	3	1	--	--	2	<1	2	1	--	--	3	1
Missouri		7	3	--	--	5	2	5	2	3	1	4	2	--	--	5	2
Montana		--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	23
Nebraska		--	--	--	--	--	--	13	7	9	5	10	5	--	--	13	7
New Jersey		11	6	--	--	--	--	8	4	--	--	6	3	--	--	8	4
New York		17	9	17	9	--	--	13	7	--	--	--	--	--	--	13	7
North Carolina		6	3	--	--	--	--	--	--	3	1	3	1	--	--	5	2
North Dakota		--	--	--	--	--	--	18	10	--	--	13	7	13	7	18	10
Ohio		11	6	--	--	--	--	8	4	--	--	6	3	--	--	8	4
Oklahoma (east)		5	2	--	--	--	--	4	2	2	1	2	1	--	--	4	2
Oklahoma (central)		8	4	--	--	--	--	6	3	4	2	4	2	--	--	6	3
Oklahoma (western)		11	6	--	--	--	--	8	4	6	3	6	3	--	--	8	4
Oregon		60	34	60	34	--	--	47	27	--	--	--	--	--	--	47	27
Pennsylvania		13	7	13	7	--	--	10	5	--	--	8	4	--	--	10	5
South Dakota		--	--	--	--	--	--	17	9	12	6	13	7	12	6	17	9
Texas (east)		4	2	--	--	3	1	3	1	2	<1	2	1	2	<1	3	1
Texas (central)		7	3	--	--	5	2	5	2	3	1	4	2	3	1	5	2
Texas (west)		17	9	--	--	13	7	13	7	9	5	10	5	9	5	13	7
Utah		91	52	--	--	--	--	--	--	--	--	--	--	--	--	71	41
Virginia		8	4	--	--	--	--	6	3	4	2	4	2	--	--	6	3
Washington		60	34	60	34	--	--	--	--	--	--	--	--	--	--	47	27
Wisconsin		--	--	--	--	--	--	10	5	--	--	8	4	--	--	10	5

SUMMARY OF ASSUMPTIONS FOR THE SLUDGE CALCULATIONS

1. The annual sludge application rate is based on the nitrogen requirement of the crop. Nitrogen is considered to be the limiting factor for determining application rates, but phosphorus runoff ultimately controls the acreage of surface application. Further, the sludge is assumed to meet regulatory requirements as to quantity of hazardous chemical compounds and pathogens.

2. All calculations are on a dry weight basis.

3. Ammonia-N availability for any particular year is as follows:

   (A) Surface Application
   Coarse Soil - 50%
   Medium Soil - 50%
   Fine-Textured Soil - 50%

   (B) Incorporated Application
   Coarse Soil - 50%
   Medium Soil - 80%
   Fine Textured Soil - 85%

   Due to volatilization, nitrification, and dentrification, no carryover of available ammonia-N to the next year is assumed; nitrate-N availability is assumed to be 100% in the first year only.

4. In the first year, 20% of the organic-N is available; in the second, third, fourth and fifth years, 10, 5, 2.5 and 1.25% of the residue from the first year is assumed to be available.

5. Organic-N is not available from the sludge applied more than 5 years previously. Hence equilibrium is reached after 5 years of application.

6. The fifth-year calculated equilibrium rate is chosen as a safe annual rate for all years.

7. Loss of sludge due to surface runoff is accounted for by adding 25% of the surface runoff loss, as calculated by the Universal Soil Loss Equation, to the annual rate.

8. Universal Soil Loss Equation is

   $$Y = R \times K \times LS \times C \times P \times S_d$$

   in which,

   Y = soil runoff in dry tons/acre

   R = rainfall erosivity factor which ranges, for example, from 35 for Montana to 350 for Louisiana

K = soil erodibility factor which is assumed to be 0.3 tons/acre/unit R for surface applications, and 0.12, 0.18 and 0.23 tons/acre/unit R for coarse, medium, and fine soils, respectively, in incorporated applications.

LS = length of slope factor which is assumed to be 0.2 for 0 to 3% slope and 0.7 for 3 to 6% slope.

C = crop cover factor which is assumed to be 0.4 for corn and 0.375 for soybeans.

P = practice factor which is assumed to be 0.75 for 0 to 3% slope and 0.37 for 3 to 6% slopes.

S_d = the sediment delivery ratio which is assumed to equal 0.45. This ratio is representative of a 3000-acre watershed draining into a typical second-order stream.

9. The soil is classified as coarse, medium, and fine-textured, representing approximate cation exchange capacities (CECs) of 0-5, 5-15, and >15 meq/100 g, respectively.

10. The composition of aerobic and anaerobic sludges is assumed constant, as given:

	Aerobic	Anaerobic
Total-N, %	4.9	5.0
Ammonia-N, mg/kg	950	9,400
Nitrate-N, mg/kg	300	520

11. A limit for phosphate-phosphorus in surface waters receiving drainage from sludge-applied soils is 100 µg/liter, with background concentration of phosphate-phosphorus of 30 µg/liter. Therefore, runoff from sludge from a watershed must not contribute more than 70 µg/liter of additional phosphate-phosphorus.

12. Only 50% of the total-P in sludge is available-P.

13. 50% of the available-P infiltrates and is adsorbed on the soil during the first rain.

14. In surface application, approximately 50% of the runoff is sludge, the remainder being soil. In incorporated application only 1% of the runoff is sludge.

15. Only 25% of the land in a watershed is assumed to be excessively sloped. Thus, much of the runoff settles out on the flatter parts of the land. Hence a factor of 0.25 is multiplied to the total watershed area in calculating the total sludge delivery to the stream.

16. In a watershed where sludge is applied, the assumption is made that up to 80% of the land may be used for agricultural purposes

COMPARISON OF MODEL-RECOMMENDED APPLICATION RATES WITH THE LITERATURE

A search of the available literature was made: (1) to assist in model development and (2) to compare the sludge application rates recommended by the model with those tested experimentally in a laboratory or field situation. The following sections describe the computerized and manual literature search, extraction of the pertinent literature data on forms, and comparison of model versus literature rates of sludge application.

Literature Search

One of the objectives during the preparation of this manual was to compare the sludge application rates recommended in the tables with those used by experimenters throughout the country. The rationale for this manual has been that the recommended sludge application rates should be considerably less than any rate found to decrease crop yields or affect the soil system in some detrimental fashion. To accomplish this objective, computerized and manual literature searches of relevant data bases were conducted. The computerized search included BIOSIS, AGRICOLA, NTIS, CRIS/USDA, and Federal Research in Progress. Abstracts of each article were reviewed, followed by the acquisition and review of the complete text of relevant articles. The bibliographies of all complete articles were also searched in order to identify the relevant titles not discovered during the computerized search. When a relevant title was identified, the text was obtained and reviewed. In addition, approximately half of the states were contacted for information or research concerning sludge application and fertilizer recommendations. Dr. Terry Logan, Professor of Agronomy at The Ohio State University, was particularly helpful in supplying background information on the use of sewage sludge in agriculture.

Several hundred abstracts and research articles were reviewed, from which approximately 200 articles and reports were used for detailed analysis. These were examined for specific information using a data extraction form (Figure 3).

Author(s): ______________________________

Article Title: ______________________________

Publication, Date: ______________________

Preparer: ______________________

Reviewer: ______________________

Crop:

Type of Study: Field _______; Greenhouse _______

Time of Year:

Location[1]:

Climate (Rainfall)[2]:

Irrigation/Non-irrigation[3]:

Soil Type(s):

Slope:

Drainage Capability:

Tillage(s):

Sludge Type(s):

Application Rate(s)[4]:

Application Method(s):

Application Rate that Limits Crop Growth:

Application Rate that Leads To Surface Run-off:

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[1] Include both State and County if information is available.

[2] Include both annual and maximum rainfall if data are available.

[3] Include method of irrigation if information is available.

[4] Include both amount and frequency of application if data are available.

Figure 2. Data Extraction Form

The information from the articles specific for each crop of interest was compared to the recommended rates (see the following sections).

The various reports and articles examined during the preparation of this manual are included in the bibliography, which also includes the specific references cited in the text. This bibliography should be useful to users who wish to investigate the subject of sludge use in agriculture more thoroughly.

Data Extraction

Data were extracted from the literature for the following ten crops: wheat, soybeans, corn, oats, sorghum, barley, cotton (including cottonseed), sunflowers, rice, and rye, because these are the ten major U.S. crops based on the acreage grown (see Table 4). Instructions for filling out the extraction form shown previously in Figure 3 are listed in Table 9.

Relatively early in the data extraction period, a quality control (QC) review was conducted by an independent, technically qualified senior researcher to evaluate the completed extraction forms for 12 randomly chosen articles. A few minor corrections and recommendations for improving the extraction process were made. These improvements were incorporated into all prior and future data extraction forms.

Data from 94 articles were found to be useful and were extracted on forms, but more research data are needed on at least four of the ten major crops. The number of research studies involving sludge application which are relevant to each of the ten major crops were as follows: corn-40, soybean-11, sorghum-10, rye-10, barley-8, wheat-7, oats-5, rice-2, cotton-1, and sunflowers-0. Additional research is especially important for the three major crops which had less than three sludge research studies reported in the literature, because most studies deal with only one soil type, one climate factor (e.g. rainfall), one sludge type, and one application method.

Data Comparison: Manual Versus Literature Rates

Sludge application rates recommended in this manual are lower than those obtained by extracting data from 50 articles dealing with five major U.S. crops

TABLE 9. INSTRUCTIONS FOR COMPLETING LITERATURE DATA EXTRACTION FORMS

In order to facilitate the process of data extraction the following guidelines were used when reviewing pertinent literature.

Crop: One of the 10 major U.S. crops (e.g., soybeans, wheat, corn) or crop guilds (e.g., hay, orchards)

Type of Study: Indicate whether the study was conducted in the field or a greenhouse.

Time of Year: Indicate season of sludge application.

Location: The particular site of the sludge-amended soil; at a minimum the state should be included and a county location is preferable if information can be obtained from the literature.

Climate: Information pertaining to rainfall should be documented including annual and maximum rainfall as well as any unusual rain events. Include frost-free periods and indicate duration of event-days when ground is frozen.

Irrigation/Non-irrigation: The use/non-use of a supplemental water supply to grow crops; in cases where irrigation is used, include the method of irrigation if information is available.

Soil type: The kind of soil under cultivation to which the sludge was applied (for example, Blount silt loam)

Slope: Landform, especially as it might relate to surface runoff.

Drainage Capability: Indicate whether the soil is poorly drained, well drained, moderately drained, and whether or not the soil is tiled. Include depth to groundwater.

Tillage: The level of tillage effort involved--either conventional, minimal, or none.

Sludge type: The level of conventional pollutants (suspended soilds, BOD, nutrients) in a particular kind of sludge--either high, medium, or low. Descriptions such as "anaerobically digested sewage sludge" should also be included. Include trace element analysis.

Application rate: The numerical amount and frequency of sludge applied to the soil generally expressed as metric tons per hectare. Include application rates of both liquid and solid components of sludge if data are available.

Application method: The physical manner in which the sludge is distributed to the soil.

TABLE 9. INSTRUCTIONS FOR COMPLETING LITERATURE DATA EXTRACTION FORMS (Continued)

Application rate that limits growth: The sludge application rate which adversely affects crop yield and/or negatively affects the ability of a given soil to sustain crop growth.

Application rate that leads to surface runoff: The maximum loading rate of sludge which would result in excessive runoff to and pollution of surface water sources. This information may not be readily available. Indicate whether this rate was actual or modeled.

(corn, sorghum, wheat, rye, and barley) (Table 10). Twenty-six articles out of the total of 76 could not be compared against model data for one or more of the following reasons: no location listed, some data for areas outside the United States, or inadequate data presented in the article. Of the 50 articles with useable data, however, 44 of the research studies used sludge application rates that were more than 50 percent higher than the values recommended by the model. The remaining 6 studies used sludge application rates that were at least 7 percent higher than those recommended by the model. All of the literature rates used for comparison were the highest sludge applications that did not result in a yield decline.

Several assumptions about the literature studies were necessary in order to compare with the manual recommended sludge application rates. It was assumed that the sludge application rates extracted from the literature were based on a single yearly application, however, in some cases the rate used was the total for several applications resulting from multiple applications during the growing season. Since the literature studies were from field plot or laboratory studies, it was assumed that the soil surface had a flat slope. Nearly all of the studies specified the application of anaerobic sludge, so those few studies which did not specify sludge type were also assumed to use anaerobic sludge. Most studies did not specify whether the sludge application rates were wet or dry, so in order to be conservative, it was assumed that all unspecified sludge application rates were dry weights.

The comparison of manual-recommended sludge application rates with those extracted from the literature confirms that the calculated rates are very conservative. The calculated rates permit continuous application for many years in a row without concern that it will result in crop yield reductions. It should be cautioned, however, that no literature data were available to evaluate the minimum sludge application rates necessary to supply optimum crop nutrition. The manual data depended on recommendations made by state agricultural extension services regarding crop nutrient requirements. The availability of these nutrients in sludge was based on chemical analysis rather than specific research projects which tested the minimum sludge rates required for optimum plant nutrition.

TABLE 10. COMPARISON OF SLUDGE APPLICATION RATES EXTRACTED FROM THE LITERATURE VERSUS RATES RECOMMENDED BY MODELING[a]

	Total (Useable) Extractions	Percentage that Modeled Rates were Less Than Literature Rates[b]			
		0-50%	51-75%	76-90%	>90%
Corn	28	4	2	8	14
Sorghum	10	1	0	5	4
Wheat	3	0	0	1	2
Rye	7	0	0	1	6
Barley	2	1	0	0	1
Totals	50	6	2	15	27

(a) A flat (0% slope) was assumed for all research studies. The majority of the literature information specified anaerobic sludge, so those few which did not specify sludge type were assumed to be anaerobic. Most literature did not specify wet or dry sludge amounts. For conservative comparisons, it was assumed that (unless otherwise specified) all sludge weights are dry weights.

(b) The literature rate used for comparison was the highest sludge application rate that did not result in a crop yield reduction.

Therefore, the application rates recommended in Appendix C of this manual are based on a theoretical approach, instead of actual application experience. As explained previously, these recommended rates are conservative in nature but should permit the safe, long-term use of sewage sludge containing very low levels of biological and chemical contaminants to croplands and orchard soils. As sludge use increases, it will be very important to revise and update this manual, so that theoretically determined rates can be compared to those actually found to be of greatest use.

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APPENDIX A

COMPUTER FORMAT

Annual Sludge Application Rate

Information Required

State: X1
Rainfall Erosivity factors, R = R1

Crop: C1

Crop yield, bu/acre	Avg.	Max.
	Y1	Y2

[Y2 = Y1/0.7]

Fertilizer Requirement of N, lb PAN/bu = F1
[PAN = Plant Available Nitrogen]

Crop Cover Factor, C = C2

Fixed Information

Sludge Concentration:	Anaerobic	Aerobic
Total N, %	N1	N4
NH_4^+-N, mg/kg	N2	N5
NO_3^--N	N3	N6
Total P, %	P5	P6

Surface Runoff Calculation (USLE)

Erodibility Factor = K1

[K1 = 0.3 tons/acre/unit R for surface application

= 0.12 tons/acre/unit R for incorporated application (coarse soil)

= 0.18 tons/acre/unit R for incorporated application (medium soil)

= 0.23 tons/acre/unit R for incorporated application (fine soil)]

Length-Slope Factor = LS
[LS = 0.2 for 0-3% slope
= 0.7 for 3-6% slope]

Practice Factor = P1
[P1 = 0.75 for 0-3% slope
= 0.37 for 3-6% slope]

Runoff = R2 t/acre/year
[R2 = R1 x K1 x LS x C1 x P1]

Amount of sludge in Runoff = S1, t/acre/year
[Surface application, S1 = 0.5 x R2
incorporated application, S1 = 0.01 x R2]

Sediment Delivery Ratio = 0.45

Sludge runoff to stream = S2, t/acre/year
[S2 = 0.45 x S1]

Application Rate Based on N-Requirement
(for anaerobic sludge)

First Year:

Total-N in sludge, mg/kg = N7 = N1 x 10,000
Organic-N in sludge, mg/kg = G1
[G1 = N7 - (N2 + N3)]

Plant Available Nitrogen (PAN):

Available NH_3-N, mg/kg = N8
[N8 = 0.5 x N2 for surface application
= 0.5 x N2 for incorporated application (coarse soil)
= 0.8 x N2 for incorporated application (medium soil)
= 0.85 x N2 for incorporated application (fine soil)

Available NO_3-N mg/kg = N9
[N9 = 0.9 x N3]

Available Org-N, mg/kg = N10
[N10 = 0.2 x G1]

Total PAN, mg/kg = N11
[N11 = N8 + N9 + N10]
= N12 lb PAN/dry ton of sludge
[N12 = 0.002 x N11]

N-requirement of crop, lb PAN/acre = N13
[N13 = F1 x Y1 for avg. yield
= F1 x Y2 for max. yield]

Sludge application rate, dry tons/acre = A1
[A1 = N13/N12]

1st year Org-N applied, lb/acre = G2
[G2 = 0.002 x N10 x A1]

1st year Org-N consumed, lb/acre = G3

1st year Org-N residue, lb/acre = G4

Second Year

1st year Org-N available, lb/acre = G5
[G5 = 0.1 x G4]

N-requirement of crop, lb PAN/acre = D1
[D1 = N13 - G5]

Sludge Application Rate, dry tons/acre = A2
[A2 = D1/N12]

2nd year Org-N applied, lb/acre = G6

2nd year Org-N consumed, lb/acre = G7

2nd year Org-N residue, lb/acre = G8

1st year Org-N residue, lb/acre = G9
[G9 = G4-G5]

Third, Fourth, Fifth Year

Same as for second year.

Fifth year sludge application rate, dry tons/acre = A5

Recommended Rate

Recommended rate, dry tons/acre = A6
[A6 = A5 + 0.25 x S1]

Land Utilization Based on Phosphorus

Sludge runoff to stream = S2, ton/acre/year

Total-P in sludge, % = P5

Total-P, lb/ton of sludge = P6
[P6 = P5 x 10000 x 0.002]

Available-P, lb/ton = P7
[P7 = 0.5 x P6]

Available-P in runoff, lb/ton = P8
[P8 = 0.5 x P7; 50% infiltrates the soil, remainder runs off]

Available-P runoff to stream, lb/acre/year = P9
[P9 = P8 x S2]

Available-P runoff to stream, mg/acre/year = P10

Annual stream flow volume, lit/year = 3.3×10^9
[for a second-order stream]

Watershed area, acres = 3008
[for a second-order stream]

Watershed area adjusted for variable slope, acres = 752
[752 acres = 0.25 x 3008]

P-concentration stream = P11 mg/lit/acre of land
[P11 = P10/3.3×10^9] [assumes all cultivated land has sludge]

P-concentration in stream μg/lit = P12
[P12 = P11 x 752]

Percentage of land available for surface application = X2 [X2 = 70 x 100/P12]

APPENDIX B

TABLE B-1. RAINFALL INTENSITY DATA FOR MAJOR CROP-PRODUCING STATES. VALUES ARE IN NUMBER OF HOURS PER MONTH AT A PARTICULAR RAINFALL INTENSITY.[a]

Site	Rainfall Intensity/hr.	January	February	March	April	May	June	July	August	September	October	November	December
Arkansas (Little Rock)	0.25 - .49 in.	23	35	29	42	35	34	15	15	20	16	31	22
	0.5 - 0.99 in.	11	10	7	10	18	12	17	9	15	5	10	5
	1.0 - 1.99 in.	1	2	0	2	10	4	7	2	4	0	2	0
	2 in. and over	0	0	0	0	1	0	0	0	0	0	0	0
California (Sacramento)	0.25 - .49 in.	6	8	4	8	0	0	0	0	5	0	5	13
	0.5 - 0.99 in.	0	0	0	0	0	0	0	0	1	0	1	2
	1.0 - 1.99 in.	0	0	0	0	0	0	0	0	0	0	0	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0
California (San Diego)	0.25 - .49 in.	5	3	9	5	0	0	0	0	1	0	4	7
	0.5 - 0.99 in.	2	1	2	0	0	0	0	0	0	0	0	0
	1.0 - 1.99 in.	0	0	1	0	0	0	0	0	0	0	0	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0
California (Fresno)	0.25 - .49 in.	3	6	4	5	2	0	0	0	0	0	4	4
	0.5 - 0.99 in.	0	1	0	0	0	0	0	0	0	0	0	0
	1.0 - 1.99 in.	0	0	0	0	0	0	0	0	0	0	0	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0
Georgia (Atlanta)	0.25 - .49 in.	29	30	25	40	24	20	24	20	29	17	13	19
	0.5 - 0.99 in.	6	4	10	8	6	11	27	8	7	4	1	4
	1.0 - 1.99 in.	0	1	0	2	0	2	6	4	3	0	1	0
	2 in. and over	0	0	0	0	1	0	0	0	0	0	0	0
Georgia (Savannah)	0.25 - .49 in.	8	16	25	23	24	38	49	34	60	20	15	13
	0.5 - 0.99 in.	1	4	5	15	16	19	22	13	24	6	1	1
	1.0 - 1.99 in.	1	0	0	1	6	6	15	14	3	2	0	0
	2 in. and over	0	0	0	0	0	1	1	1	0	0	0	0

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[a] Complied from: Climates of the States, National Oceanographic and Atmospheric Administration, Washington, D.C.

TABLE B-1. RAINFALL INTENSITY DATA FOR MAJOR CROP-PRODUCING STATES. VALUES ARE IN NUMBER OF HOURS PER MONTH AT A PARTICULAR RAINFALL INTENSITY.(a) (CONT)

Site	Rainfall Intensity/hr.	January	February	March	April	May	June	July	August	September	October	November	December
Georgia (Macon)	0.25 - .49 in.	8	26	27	10	11	8	15	10	14	9	5	3
	0.5 - 0.99 in.	0	3	4	3	8	3	12	4	5	2	3	2
	1.0 - 1.99 in.	0	0	0	2	1	2	4	2	2	0	1	1
	2 in. and over	0	0	0	0	1	2	0	1	0	0	0	0
Idaho (Boise)	0.25 - .49 in.	0	0	0	2	4	0	1	3	0	0	0	0
	0.5 - 0.99 in.	0	0	0	0	0	2	1	0	0	0	0	0
	1.0 - 1.99 in.	0	0	0	0	0	0	0	0	0	0	0	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0
Illinois (Springfield)	0.25 - .49 in.	3	7	7	18	19	28	37	23	10	20	4	3
	0.5 - 0.99 in.	0	0	2	5	5	15	11	8	5	4	1	0
	1.0 - 1.99 in.	0	0	0	0	0	10	4	2	3	0	0	0
	2 in. and over	0	0	0	1	0	0	1	0	0	0	0	0
Illinois (Chicago, Midway Airport)	0.25 - .49 in.	3	5	9	12	17	18	34	20	10	13	2	3
	0.5 - 0.99 in.	0	0	1	4	5	12	12	10	7	3	3	0
	1.0 - 1.99 in.	0	0	0	1	0	4	3	5	0	4	0	0
	2 in. and over	0	0	0	0	0	1	1	0	0	0	0	0
Iowa (Des Moines)	0.25 - .49 in.	6	0	3	8	31	20	18	23	9	5	12	0
	0.5 - 0.99 in.	0	0	1	3	11	11	10	13	5		3	0
	1.0 - 1.99 in.	0	0	0	0	2	3	4	3	0	0	0	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0
Iowa (Sioux City)	0.25 - .49 in.	0	1	1	11	21	22	20	19	7	8	3	0
	0.5 - 0.99 in.	0	0	1	1	5	10	9	7	7	2	1	0
	1.0 - 1.99 in.	0	0	0	0	0	3	4	1	1	0	0	0
	2 in. and over	0	0	0	0	0	1	0	0	0	0	0	0

TABLE B-1. RAINFALL INTENSITY DATA FOR MAJOR CROP-PRODUCING STATES. VALUES ARE IN NUMBER OF HOURS PER MONTH AT A PARTICULAR RAINFALL INTENSITY.(a) (CONT)

Site	Rainfall Intensity/hr.	January	February	March	April	May	June	July	August	September	October	November	December
Minnesota (Duluth)	0.25 - .49 in.	0	0	2	7	14	23	35	21	16	3	4	0
	0.5 - 0.99 in.	0	0	0	0	3	9	13	13	7	0	0	0
	1.0 - 1.99 in.	0	0	0	0	0	3	1	2	0	0	0	0
	2 in. and over	0	0	0	0	0	1	0	0	0	0	0	0
Mississippi (Jackson)	0.25 - .49 in.	29	27	30	33	33	21	31	25	17	11	21	37
	0.5 - 0.99 in.	9	4	12	9	12	19	15	12	8	5	5	10
	1.0 - 1.99 in.	2	1	1	7	6	4	5	2	6	0	0	0
	2 in. and over	0	0	0	0	1	0	1	0	0	0	0	0
Montana (Great Falls)	0.25 - .49 in.	0	0	0	1	4	13	7	3	1	0	0	0
	0.5 - 0.99 in.	0	0	0	1	0	1	1	0	0	0	0	0
	1.0 - 1.99 in.	0	0	0	0	0	0	0	0	0	0	0	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0
Nebraska (Omaha)	0.25 - .49 in.	0	1	4	12	34	25	17	35	23	10	9	0
	0.5 - 0.99 in.	0	0	0	7	11	15	10	25	3	2	0	0
	1.0 - 1.99 in.	0	0	0	2	2	2	5	6	1	0	1	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0
North Dakota (Fargo)	0.25 - .49 in.	0	0	0	4	7	26	17	21	8	0	0	0
	0.5 - 0.99 in.	0	0	0	1	1	8	17	3	1	1	0	0
	1.0 - 1.99 in.	0	0	0	0	0	1	7	4	1	0	0	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0
Ohio (Akron)	0.25 - .49 in.	12	4	10	12	12	24	28	21	15	12	7	0
	0.5 - 0.99 in.	0	1	0	1	10	10	16	8	6	2	1	0
	1.0 - 1.99 in.	0	0	0	0	2	2	2	3	0	0	0	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0

TABLE B-1. RAINFALL INTENSITY DATA FOR MAJOR CROP-PRODUCING STATES. VALUES ARE IN NUMBER OF HOURS PER MONTH AT A PARTICULAR RAINFALL INTENSITY.[a] (CONT)

Site	Rainfall Intensity/hr.	January	February	March	April	May	June	July	August	September	October	November	December
Ohio (Dayton)	0.25 - .49 in.	14	7	9	10	12	19	9	10	17	11	11	1
	0.5 - 0.99 in.	5	2	0	5	10	15	2	8	2	1	4	1
	1.0 - 1.99 in.	0	0	0	0	1	2	1	1	1	0	0	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0
Ohio (Columbus)	0.25 - .49 in.	13	3	11	15	32	26	34	20	10	6	8	1
	0.5 - 0.99 in.	4	1	0	0	8	13	11	7	4	4	1	0
	1.0 - 1.99 in.	0	0	0	0	0	1	5	0	0	0	0	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0
Oklahoma (Oklahoma City)	0.25 - .49 in.	3	4	15	18	42	27	19	10	18	28	5	6
	0.5 - 0.99 in.	1	1	0	13	23	15	12	9	10	10	0	0
	1.0 - 1.99 in.	0	0	0	1	5	6	5	3	4	2	0	1
	2 in. and over	0	0	0	0	0	1	0	0	0	0	0	0
Oklahoma (Tulsa)	0.25 - .49 in.	6	7	13	28	39	24	30	11	23	28	4	6
	0.5 - 0.99 in.	0	1	3	16	16	14	11	12	13	8	4	2
	1.0 - 1.99 in.	0	0	0	2	4	2	5	2	1	3	0	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0
South Dakota (Rapid City)	0.25 - .49 in.	0	0	0	0	4	7	4	6	0	0	0	0
	0.5 - 0.99 in.	0	0	0	0	1	1	1	0	0	0	0	0
	1.0 - 1.99 in.	0	0	0	0	2	0	2	0	0	0	0	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0
South Dakota (Huron)	0.25 - .49 in.	1	0	0	0	15	22	8	12	6	3	0	0
	0.5 - 0.99 in.	0	0	0	1	4	10	4	5	0	1	0	0
	1.0 - 1.99 in.	0	0	0	0	0	1	1	3	0	0	0	0
	2 in. and over	0	0	0	0	0	0	0	1	0	0	0	0

TABLE B-1. RAINFALL INTENSITY DATA FOR MAJOR CROP-PRODUCING STATES. VALUES ARE IN NUMBER OF HOURS PER MONTH AT A PARTICULAR RAINFALL INTENSITY:(a) (CONT)

Site	Rainfall Intensity/hr.	January	February	March	April	May	June	July	August	September	October	November	December
Texas (Houston)	0.25 - .49 in.	18	28	14	23	16	18	20	27	23	32	17	18
	0.5 - 0.99 in.	4	6	4	20	16	15	20	10	10	12	16	7
	1.0 - 1.99 in.	1	0	0	2	2	7	10	3	5	6	2	0
	2 in. and over	0	0	0	0	0	1	0	0	0	2	0	0
Texas (Waco)	0.25 - .49 in.	6	3	6	18	10	11	6	6	13	14	8	9
	0.5 - 0.99 in.	0	1	4	6	5	4	1	4	6	6	1	2
	1.0 - 1.99 in.	0	0	0	3	4	0	0	4	1	2	0	0
	2 in. and over	0	0	0	0	1	0	0	0	0	0	0	0
Texas (Amarillo)	0.25 - .49 in.	1	3	1	10	15	16	25	15	8	12	1	2
	0.5 - 0.99 in.	0	0	0	2	12	5	8	6	6	2	0	0
	1.0 - 1.99 in.	0	0	0	0	2	2	1	2	1	1	0	0
	2 in. and over	0	0	0	0	0	3	0	0	0	0	0	
Virginia (Richmond)	0.25 - .49 in.	4	10	14	21	19	22	33	62	20	20	22	15
	0.5 - 0.99 in.	3	1	1	4	7	10	13	20	10	7	6	3
	1.0 - 1.99 in.	0	0	0	0	1	4	7	6	3	2	1	0
	2 in. and over	0	0	0	0	0	0	2	1	0	0	0	0
Virginia (Norfolk)	0.25 - .49 in.	8	8	9	6	18	12	20	19	15	21	4	11
	0.5 - 0.99 in.	1	2	1	1	2	6	6	10	9	1	1	0
	1.0 - 1.99 in.	0	0	0	0	0	2	2	7	5	4	0	0
	2 in. and over	0	0	0	0	0	0	0	0	1	0	0	
Washington (Spokane)	0.25 - .49 in.	0	0	0	0	3	4	4	1	0	1	1	0
	0.5 - 0.99 in.	0	0	0	0	0	1	0	0	0	0	0	0
	1.0 - 1.99 in.	0	0	0	0	0	0	0	0	0	0	0	0
	2 in. and over	0	0	0	0	0	0	0	0	0	0	0	0

(a) Complied from: Climates of the States, National Oceanographic and Atmospheric Administration, Washington, D.C.

APPENDIX C

SLUDGE APPLICATION TABLES

RECOMMENDED SLUDGE APPLICATION RATES FOR:

ARIZONA

Crops Included:

Barley
Citrus
Corn
Cotton
Forages
Grapes, Vineyards
Horticulture
Sorghum
Tree Farming
Wheat

Annual Sludge Application Rate, dry tons/acre *
ARIZONA ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	104	5.4	5.4	5.4	5.5	5.5	5.5
¦	Surface	149	7.7	7.7	7.7	7.8	7.8	7.8
¦	Incorp.	104	5.4	5.3	5.3	5.4	5.3	5.3
¦	Incorp.	149	7.7	7.5	7.5	7.7	7.5	7.5
Anaerobic	Surface	104	5.0	5.0	5.0	5.0	5.0	5.0
¦	Surface	149	7.1	7.1	7.1	7.1	7.1	7.1
¦	Incorp.	104	4.9	4.3	4.2	4.9	4.3	4.2
¦	Incorp.	149	7.0	6.1	6.0	7.0	6.1	6.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARIZONA ----- CITRUS

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	4.0	4.0	4.0	4.0	4.0	4.0
¦	Incorp.	3.9	3.9	3.9	3.9	3.9	3.9
Anaerobic	Surface	3.6	3.6	3.6	3.7	3.7	3.7
¦	Incorp.	3.6	3.1	3.1	3.6	3.1	3.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARIZONA ----- CORN

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	136	5.2	5.2	5.2	5.3	5.3	5.3
	Surface	194	7.4	7.4	7.4	7.4	7.4	7.4
	Incorp.	136	5.1	5.0	5.0	5.1	5.0	5.0
	Incorp.	194	7.2	7.1	7.1	7.2	7.1	7.1
Anaerobic	Surface	136	4.7	4.7	4.7	4.8	4.8	4.8
	Surface	194	6.7	6.7	6.7	6.8	6.8	6.8
	Incorp.	136	4.6	4.0	3.9	4.6	4.0	3.9
	Incorp.	194	6.6	5.7	5.6	6.6	5.7	5.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARIZONA ----- COTTON

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield lb/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	1247	3.2	3.2	3.2	3.3	3.3	3.3
	Surface	1781	4.6	4.6	4.6	4.7	4.7	4.7
	Incorp.	1247	3.1	3.1	3.1	3.1	3.1	3.1
	Incorp.	1781	4.5	4.4	4.4	4.5	4.4	4.4
Anaerobic	Surface	1247	3.0	3.0	3.0	3.0	3.0	3.0
	Surface	1781	4.2	4.2	4.2	4.3	4.3	4.3
	Incorp.	1247	2.8	2.5	2.4	2.8	2.5	2.4
	Incorp.	1781	4.1	3.5	3.5	4.1	3.5	3.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARIZONA ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	7	0.9	0.9	0.9	0.9	0.9	0.9
	Surface	10	1.2	1.2	1.2	1.2	1.2	1.2
	Incorp.	7	0.8	0.8	0.8	0.8	0.8	0.8
	Incorp.	10	1.1	1.1	1.1	1.1	1.1	1.1
Anaerobic	Surface	7	0.8	0.8	0.8	0.8	0.8	0.8
	Surface	10	1.1	1.1	1.1	1.1	1.1	1.1
	Incorp.	7	0.7	0.6	0.6	0.7	0.6	0.6
	Incorp.	10	1.0	0.9	0.9	1.0	0.9	0.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARIZONA ----- GRAPES, VINEYARDS

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	1.6	1.6	1.6	1.7	1.7	1.7
	Incorp.	1.5	1.5	1.5	1.5	1.5	1.5
Anaerobic	Surface	1.5	1.5	1.5	1.5	1.5	1.5
	Incorp.	1.4	1.2	1.2	1.4	1.2	1.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARIZONA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.5	3.5	3.5	3.5	3.5	3.5
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.2	3.2	3.2	3.2	3.2	3.2
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARIZONA ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	79	2.8	2.8	2.8	2.9	2.9	2.9
	Surface	113	4.0	4.0	4.0	4.1	4.1	4.1
	Incorp.	79	2.7	2.7	2.7	2.7	2.7	2.7
	Incorp.	113	3.9	3.8	3.8	3.9	3.8	3.8
Anaerobic	Surface	79	2.6	2.6	2.6	2.7	2.7	2.7
	Surface	113	3.6	3.6	3.6	3.7	3.7	3.7
	Incorp.	79	2.5	2.2	2.1	2.5	2.2	2.1
	Incorp.	113	3.5	3.1	3.0	3.5	3.1	3.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre
ARIZONA ----- TREE FARMING *

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	5.8	5.8	5.8	5.8	5.8	5.8
	Incorp.	5.7	5.6	5.6	5.7	5.6	5.6
Anaerobic	Surface	5.3	5.3	5.3	5.3	5.3	5.3
	Incorp.	5.2	4.6	4.5	5.2	4.6	4.5

* Includes white pines, Douglas-fir, southern pine, spruce, aspen, oak, and hickory.

Annual Sludge Application Rate, dry tons/acre *
ARIZONA ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	93	3.3	3.3	3.3	3.3	3.3	3.3
	Surface	133	4.7	4.7	4.7	4.7	4.7	4.7
	Incorp.	93	3.2	3.1	3.1	3.2	3.1	3.1
	Incorp.	133	4.6	4.5	4.5	4.6	4.5	4.5
Anaerobic	Surface	93	3.0	3.0	3.0	3.0	3.0	3.0
	Surface	133	4.2	4.2	4.2	4.3	4.3	4.3
	Incorp.	93	2.9	2.5	2.5	2.9	2.5	2.5
	Incorp.	133	4.2	3.6	3.6	4.2	3.6	3.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

ARKANSAS

Crops Included:

Apples
Corn
Cotton
Forages
Grapes, Vineyards
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rice
Sorghum
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
ARKANSAS ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.3	3.3	3.3	3.6	3.6	3.6
	Surface	130	4.1	4.1	4.1	4.4	4.4	4.4
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	3.0	3.0	3.0	3.3	3.3	3.3
	Surface	130	3.8	3.8	3.8	4.1	4.1	4.1
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARKANSAS ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	90	4.1	4.1	4.1	4.6	4.6	4.6
	Surface	129	5.5	5.5	5.5	6.1	6.1	6.1
	Incorp.	90	3.4	3.3	3.3	3.4	3.3	3.3
	Incorp.	129	4.8	4.7	4.7	4.8	4.7	4.7
Anaerobic	Surface	90	3.8	3.8	3.8	4.3	4.3	4.3
	Surface	129	5.1	5.1	5.1	5.6	5.6	5.6
	Incorp.	90	3.1	2.7	2.6	3.1	2.7	2.6
	Incorp.	129	4.4	3.8	3.7	4.4	3.8	3.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARKANSAS ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	657	2.4	2.4	2.4	2.9	2.9	2.9
	Surface	939	3.1	3.1	3.1	3.6	3.6	3.6
	Incorp.	657	1.7	1.6	1.6	1.7	1.6	1.6
	Incorp.	939	2.4	2.3	2.3	2.4	2.3	2.3
Anaerobic	Surface	657	2.2	2.2	2.2	2.8	2.8	2.8
	Surface	939	2.9	2.9	2.9	3.4	3.4	3.4
	Incorp.	657	1.5	1.3	1.3	1.5	1.3	1.3
	Incorp.	939	2.1	1.9	1.8	2.2	1.9	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARKANSAS ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.7	0.7	0.7	1.0	1.0	1.0
	Surface	3	0.8	0.8	0.8	1.1	1.1	1.1
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
Anaerobic	Surface	2	0.7	0.7	0.7	1.0	1.0	1.0
	Surface	3	0.8	0.8	0.8	1.1	1.1	1.1
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.2	0.3	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARKANSAS ----- GRAPES, VINEYARDS

		Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2.0	2.0	2.0	2.3	2.3	2.3
¦	Incorp.	1.6	1.5	1.5	1.6	1.5	1.5
Anaerobic	Surface	1.8	1.8	1.8	2.1	2.1	2.1
¦	Incorp.	1.4	1.2	1.2	1.4	1.2	1.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARKANSAS ----- HORTICULTURE

		Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.9	3.9	3.9	4.2	4.2	4.2
¦	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.5	3.5	3.5	3.8	3.8	3.8
¦	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARKANSAS ----- OATS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	72	2.4	2.4	2.4	2.8	2.8	2.8
	Surface	103	3.2	3.2	3.2	3.6	3.6	3.6
	Incorp.	72	1.9	1.8	1.8	1.9	1.8	1.8
	Incorp.	103	2.7	2.6	2.6	2.7	2.6	2.6
Anaerobic	Surface	72	2.2	2.2	2.2	2.6	2.6	2.6
	Surface	103	2.9	2.9	2.9	3.3	3.3	3.3
	Incorp.	72	1.7	1.5	1.5	1.7	1.5	1.5
	Incorp.	103	2.4	2.1	2.1	2.4	2.1	2.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARKANSAS ----- PEACH,NECTARINE,CHERRY,PLUM

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.6	2.6	2.6	2.9	2.9	2.9
	Surface	130	3.2	3.2	3.2	3.5	3.5	3.5
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.8
Anaerobic	Surface	100	2.4	2.4	2.4	2.7	2.7	2.7
	Surface	130	3.0	3.0	3.0	3.3	3.3	3.3
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARKANSAS ----- RICE

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	4290	2.7	2.7	2.7	3.1	3.1	3.1
	Surface	6129	3.6	3.6	3.6	4.0	4.0	4.0
	Incorp.	4290	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	6129	3.1	3.0	3.0	3.1	3.0	3.0
Anaerobic	Surface	4290	2.5	2.5	2.5	2.9	2.9	2.9
	Surface	6129	3.3	3.3	3.3	3.7	3.7	3.7
	Incorp.	4290	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	6129	2.8	2.4	2.4	2.8	2.5	2.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARKANSAS ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	60	2.8	2.8	2.8	3.3	3.3	3.3
	Surface	86	3.7	3.7	3.7	4.2	4.2	4.2
	Incorp.	60	2.1	2.0	2.0	2.1	2.0	2.0
	Incorp.	86	3.0	2.9	2.9	3.0	2.9	2.9
Anaerobic	Surface	60	2.6	2.6	2.6	3.1	3.1	3.1
	Surface	86	3.4	3.4	3.4	3.9	3.9	3.9
	Incorp.	60	1.9	1.6	1.6	1.9	1.7	1.6
	Incorp.	86	2.7	2.3	2.3	2.7	2.4	2.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARKANSAS ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	24	3.5	3.5	3.5	4.0	4.0	4.0
	Surface	34	4.7	4.7	4.7	5.2	5.2	5.2
	Incorp.	24	2.8	2.8	2.8	2.8	2.8	2.8
	Incorp.	34	4.0	4.0	4.0	4.0	4.0	4.0
Anaerobic	Surface	24	3.3	3.3	3.3	3.7	3.7	3.7
	Surface	34	4.4	4.4	4.4	4.8	4.8	4.8
	Incorp.	24	2.6	2.2	2.2	2.6	2.3	2.2
	Incorp.	34	3.7	3.2	3.1	3.7	3.2	3.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ARKANSAS ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	41	1.9	1.9	1.9	2.3	2.3	2.3
	Surface	59	2.5	2.5	2.5	2.9	2.9	2.9
	Incorp.	41	1.4	1.4	1.4	1.4	1.4	1.4
	Incorp.	59	2.0	2.0	2.0	2.0	2.0	2.0
Anaerobic	Surface	41	1.8	1.8	1.8	2.2	2.2	2.2
	Surface	59	2.4	2.4	2.4	2.7	2.7	2.7
	Incorp.	41	1.3	1.1	1.1	1.3	1.1	1.1
	Incorp.	59	1.8	1.6	1.6	1.8	1.6	1.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

CALIFORNIA

Crops Included:

- Apples
- Barley
- Citrus
- Corn
- Cotton
- Forages
- Grapes, Vineyards
- Horticulture
- Oats
- Peach, Nectarine, Cherry, Plum
- Pear
- Rice
- Sorghum
- Wheat

Annual Sludge Application Rate, dry tons/acre *
CALIFORNIA ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.9	2.9	2.9	2.9	2.9	2.9
:	Surface	130	3.8	3.8	3.8	3.8	3.8	3.8
:	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
:	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.7	2.7	2.7	2.7	2.7	2.7
:	Surface	130	3.4	3.4	3.4	3.5	3.5	3.5
:	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
:	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

CALIFORNIA ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	63	3.3	3.3	3.3	3.3	3.3	3.3
:	Surface	90	4.7	4.7	4.7	4.7	4.7	4.7
:	Incorp.	63	3.3	3.2	3.2	3.3	3.2	3.2
:	Incorp.	90	4.6	4.6	4.6	4.6	4.6	4.6
Anaerobic	Surface	63	3.0	3.0	3.0	3.1	3.1	3.1
:	Surface	90	4.3	4.3	4.3	4.3	4.3	4.3
:	Incorp.	63	3.0	2.6	2.5	3.0	2.6	2.5
:	Incorp.	90	4.2	3.7	3.6	4.2	3.7	3.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CALIFORNIA ----- CITRUS

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	4.0	4.0	4.0	4.0	4.0	4.0
	Incorp.	3.9	3.9	3.9	3.9	3.9	3.9
Anaerobic	Surface	3.6	3.6	3.6	3.6	3.6	3.6
	Incorp.	3.6	3.1	3.1	3.6	3.1	3.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CALIFORNIA ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	130	4.9	4.9	4.9	5.0	5.0	5.0
	Surface	186	7.0	7.0	7.0	7.1	7.1	7.1
	Incorp.	130	4.8	4.8	4.8	4.8	4.8	4.8
	Incorp.	186	6.9	6.8	6.8	6.9	6.8	6.8
Anaerobic	Surface	130	4.5	4.5	4.5	4.5	4.5	4.5
	Surface	186	6.4	6.4	6.4	6.4	6.4	6.4
	Incorp.	130	4.4	3.8	3.8	4.4	3.8	3.8
	Incorp.	186	6.3	5.5	5.4	6.3	5.5	5.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CALIFORNIA ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	1109	2.9	2.9	2.9	2.9	2.9	2.9
	Surface	1584	4.1	4.1	4.1	4.1	4.1	4.1
	Incorp.	1109	2.8	2.7	2.7	2.8	2.7	2.7
	Incorp.	1584	4.0	3.9	3.9	4.0	3.9	3.9
Anaerobic	Surface	1109	2.6	2.6	2.6	2.7	2.7	2.7
	Surface	1584	3.7	3.7	3.7	3.8	3.8	3.8
	Incorp.	1109	2.5	2.2	2.2	2.5	2.2	2.2
	Incorp.	1584	3.6	3.2	3.1	3.6	3.2	3.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CALIFORNIA ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	5	0.6	0.6	0.6	0.7	0.7	0.7
	Surface	7	0.9	0.9	0.9	0.9	0.9	0.9
	Incorp.	5	0.6	0.6	0.6	0.6	0.6	0.6
	Incorp.	7	0.9	0.8	0.8	0.9	0.8	0.8
Anaerobic	Surface	5	0.6	0.6	0.6	0.6	0.6	0.6
	Surface	7	0.8	0.8	0.8	0.9	0.9	0.9
	Incorp.	5	0.5	0.5	0.5	0.5	0.5	0.5
	Incorp.	7	0.8	0.7	0.7	0.8	0.7	0.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CALIFORNIA ----- GRAPES, VINEYARDS

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	1.6	1.6	1.6	1.6	1.6	1.6
¦	Incorp.	1.5	1.5	1.5	1.5	1.5	1.5
Anaerobic	Surface	1.5	1.5	1.5	1.5	1.5	1.5
¦	Incorp.	1.4	1.2	1.2	1.4	1.2	1.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CALIFORNIA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.5	3.5	3.5	3.5	3.5	3.5
¦	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.2	3.2	3.2	3.2	3.2	3.2
¦	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CALIFORNIA ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	67	1.8	1.8	1.8	1.8	1.8	1.8
	Surface	96	2.5	2.5	2.5	2.6	2.6	2.6
	Incorp.	67	1.7	1.7	1.7	1.7	1.7	1.7
	Incorp.	96	2.5	2.4	2.4	2.5	2.4	2.4
Anaerobic	Surface	67	1.6	1.6	1.6	1.7	1.7	1.7
	Surface	96	2.3	2.3	2.3	2.3	2.3	2.3
	Incorp.	67	1.6	1.4	1.3	1.6	1.4	1.3
	Incorp.	96	2.2	2.0	1.9	2.2	2.0	1.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CALIFORNIA ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.2	2.2	2.2	2.2	2.2	2.2
	Surface	130	2.8	2.8	2.8	2.9	2.9	2.9
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.0	2.0	2.0	2.0	2.0	2.0
	Surface	130	2.6	2.6	2.6	2.6	2.6	2.6
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CALIFORNIA ----- PEARS

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	1.1	1.1	1.1	1.2	1.2	1.2
	Surface	130	1.5	1.5	1.5	1.5	1.5	1.5
	Incorp.	100	1.1	1.1	1.1	1.1	1.1	1.1
	Incorp.	130	1.4	1.4	1.4	1.4	1.4	1.4
Anaerobic	Surface	100	1.0	1.0	1.0	1.1	1.1	1.1
	Surface	130	1.3	1.3	1.3	1.4	1.4	1.4
	Incorp.	100	1.0	0.9	0.8	1.0	0.9	0.8
	Incorp.	130	1.3	1.1	1.1	1.3	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CALIFORNIA ----- RICE

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	7040	3.6	3.6	3.6	3.6	3.6	3.6
	Surface	10057	5.1	5.1	5.1	5.1	5.1	5.1
	Incorp.	7040	3.5	3.5	3.5	3.5	3.5	3.5
	Incorp.	10057	5.0	5.0	5.0	5.0	5.0	5.0
Anaerobic	Surface	7040	3.3	3.3	3.3	3.3	3.3	3.3
	Surface	10057	4.6	4.6	4.6	4.7	4.7	4.7
	Incorp.	7040	3.2	2.8	2.7	3.2	2.8	2.7
	Incorp.	10057	4.6	4.0	3.9	4.6	4.0	3.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CALIFORNIA ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	81	2.9	2.9	2.9	2.9	2.9	2.9
	Surface	116	4.1	4.1	4.1	4.1	4.1	4.1
	Incorp.	81	2.8	2.7	2.7	2.8	2.7	2.7
	Incorp.	116	4.0	3.9	3.9	4.0	3.9	3.9
Anaerobic	Surface	81	2.6	2.6	2.6	2.7	2.7	2.7
	Surface	116	3.7	3.7	3.7	3.8	3.8	3.8
	Incorp.	81	2.5	2.2	2.2	2.5	2.2	2.2
	Incorp.	116	3.6	3.2	3.1	3.6	3.2	3.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre
CALIFORNIA ----- TREE FARMING *

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	5.8	5.8	5.8	5.8	5.8	5.8
	Incorp.	5.7	5.6	5.6	5.7	5.6	5.6
Anaerobic	Surface	5.3	5.3	5.3	5.3	5.3	5.3
	Incorp.	5.2	4.6	4.5	5.2	4.6	4.5

* Includes white pines, Douglas-fir, southern pine, spruce,

Annual Sludge Application Rate, dry tons/acre *
CALIFORNIA ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	79	2.8	2.8	2.8	2.8	2.8	2.8
	Surface	113	3.9	3.9	3.9	4.0	4.0	4.0
	Incorp.	79	2.7	2.7	2.7	2.7	2.7	2.7
	Incorp.	113	3.9	3.8	3.8	3.9	3.8	3.8
Anaerobic	Surface	79	2.5	2.5	2.5	2.6	2.6	2.6
	Surface	113	3.6	3.6	3.6	3.6	3.6	3.6
	Incorp.	79	2.5	2.2	2.1	2.5	2.2	2.1
	Incorp.	113	3.5	3.1	3.0	3.5	3.1	3.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

COLORADO (East)

Crops Included:

Barley
Corn
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rye
Sorghum
Tree Farming
Wheat

Annual Sludge Application Rate, dry tons/acre *
COLORADO(E) ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	75	4.0	4.0	4.0	4.1	4.1	4.1
	Surface	107	5.6	5.6	5.6	5.7	5.7	5.7
	Incorp.	75	3.9	3.8	3.8	3.9	3.8	3.8
	Incorp.	107	5.5	5.4	5.4	5.5	5.4	5.4
Anaerobic	Surface	75	3.6	3.6	3.6	3.7	3.7	3.7
	Surface	107	5.1	5.1	5.1	5.2	5.2	5.2
	Incorp.	75	3.5	3.1	3.0	3.5	3.1	3.0
	Incorp.	107	5.0	4.4	4.3	5.0	4.4	4.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
COLORADO(E) ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	135	5.2	5.2	5.2	5.3	5.3	5.3
	Surface	193	7.4	7.4	7.4	7.5	7.5	7.5
	Incorp.	135	5.0	5.0	4.9	5.0	5.0	4.9
	Incorp.	193	7.2	7.1	7.1	7.2	7.1	7.1
Anaerobic	Surface	135	4.7	4.7	4.7	4.9	4.9	4.9
	Surface	193	6.7	6.7	6.7	6.8	6.8	6.8
	Incorp.	135	4.6	4.0	3.9	4.6	4.0	3.9
	Incorp.	193	6.5	5.7	5.6	6.5	5.7	5.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
COLORADO(E) ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.4	0.4	0.4	0.5	0.5	0.5
	Surface	3	0.5	0.5	0.5	0.6	0.6	0.6
	Incorp.	2	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	3	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	2	0.4	0.4	0.4	0.4	0.4	0.4
	Surface	3	0.5	0.5	0.5	0.5	0.5	0.5
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.4	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
COLORADO(E) ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.5	3.5	3.5	3.6	3.6	3.6
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.2	3.2	3.2	3.3	3.3	3.3
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
COLORADO(E) ----- OATS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	57	1.6	1.6	1.6	1.7	1.7	1.7
	Surface	81	2.2	2.2	2.2	2.3	2.3	2.3
	Incorp.	57	1.5	1.4	1.4	1.5	1.4	1.4
	Incorp.	81	2.1	2.1	2.1	2.1	2.1	2.1
Anaerobic	Surface	57	1.5	1.5	1.5	1.5	1.5	1.5
	Surface	81	2.0	2.0	2.0	2.1	2.1	2.1
	Incorp.	57	1.3	1.2	1.1	1.3	1.2	1.1
	Incorp.	81	1.9	1.7	1.6	1.9	1.7	1.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
COLORADO(E) ----- PEACH,NECTARINE,CHERRY,PLUM

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.2	2.2	2.2	2.3	2.3	2.3
	Surface	130	2.9	2.9	2.9	3.0	3.0	3.0
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.1	2.1	2.1	2.1	2.1	2.1
	Surface	130	2.6	2.6	2.6	2.7	2.7	2.7
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
COLORADO(E) ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	20	0.8	0.8	0.8	0.8	0.8	0.8
	Surface	29	1.0	1.0	1.0	1.1	1.1	1.1
	Incorp.	20	0.6	0.6	0.6	0.6	0.6	0.6
	Incorp.	29	0.9	0.9	0.9	0.9	0.9	0.9
Anaerobic	Surface	20	0.7	0.7	0.7	0.8	0.8	0.8
	Surface	29	0.9	0.9	0.9	1.0	1.0	1.0
	Incorp.	20	0.6	0.5	0.5	0.6	0.5	0.5
	Incorp.	29	0.8	0.7	0.7	0.8	0.7	0.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
COLORADO(E) ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	33	1.3	1.3	1.3	1.4	1.4	1.4
	Surface	47	1.8	1.8	1.8	1.9	1.9	1.9
	Incorp.	33	1.1	1.1	1.1	1.1	1.1	1.1
	Incorp.	47	1.6	1.6	1.6	1.6	1.6	1.6
Anaerobic	Surface	33	1.2	1.2	1.2	1.3	1.3	1.3
	Surface	47	1.6	1.6	1.6	1.8	1.8	1.8
	Incorp.	33	1.0	0.9	0.9	1.0	0.9	0.9
	Incorp.	47	1.5	1.3	1.3	1.5	1.3	1.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre
COLORADO(E) ----- TREE FARMING *

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	5.8	5.8	5.8	5.9	5.9	5.9
	Incorp.	5.7	5.6	5.6	5.7	5.6	5.6
Anaerobic	Surface	5.3	5.3	5.3	5.4	5.4	5.4
	Incorp.	5.2	4.6	4.5	5.2	4.6	4.5

* Includes white pines, Douglas-fir, southern pine, spruce, aspen, oak, and hickory.

Annual Sludge Application Rate, dry tons/acre *
COLORADO(E) ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	40	1.5	1.5	1.5	1.6	1.6	1.6
	Surface	57	2.1	2.1	2.1	2.2	2.2	2.2
	Incorp.	40	1.4	1.4	1.4	1.4	1.4	1.4
	Incorp.	57	2.0	1.9	1.9	2.0	1.9	1.9
Anaerobic	Surface	40	1.4	1.4	1.4	1.5	1.5	1.5
	Surface	57	1.9	1.9	1.9	2.0	2.0	2.0
	Incorp.	40	1.3	1.1	1.1	1.3	1.1	1.1
	Incorp.	57	1.8	1.6	1.5	1.8	1.6	1.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

CONNECTICUT

Crops Included:

Apples
Forages
Horticulture
Peach, Nectarine, Cherry, Plum
Pear

Annual Sludge Application Rate, dry tons/acre *
CONNECTICUT ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.1	3.1	3.1	3.2	3.2	3.2
	Surface	130	3.9	3.9	3.9	4.1	4.1	4.1
	incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.8	2.8	2.8	2.9	2.9	2.9
	Surface	130	3.6	3.6	3.6	3.7	3.7	3.7
	incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CONNECTICUT ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.5	0.5	0.5	0.6	0.6	0.6
	Surface	3	0.6	0.6	0.6	0.8	0.8	0.8
	Incorp.	2	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	3	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	2	0.5	0.5	0.5	0.6	0.6	0.6
	Surface	3	0.6	0.6	0.6	0.7	0.7	0.7
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CONNECTICUT ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	3.6	3.6	3.6	3.8	3.8	3.8
¦	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.3	3.3	3.3	3.5	3.5	3.5
¦	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CONNECTICUT ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	100	2.3	2.3	2.3	2.5	2.5	2.5
¦	Surface	130	3.0	3.0	3.0	3.1	3.1	3.1
¦	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
¦	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.1	2.1	2.1	2.3	2.3	2.3
¦	Surface	130	2.7	2.7	2.7	2.9	2.9	2.9
¦	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
¦	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
CONNECTICUT ----- PEARS

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	100	1.3	1.3	1.3	1.4	1.4	1.4
	Surface	130	1.6	1.6	1.6	1.7	1.7	1.7
	Incorp.	100	1.1	1.1	1.1	1.1	1.1	1.1
	Incorp.	130	1.4	1.4	1.4	1.4	1.4	1.4
Anaerobic	Surface	100	1.2	1.2	1.2	1.3	1.3	1.3
	Surface	130	1.5	1.5	1.5	1.6	1.6	1.6
	Incorp.	100	1.0	0.9	0.8	1.0	0.9	0.9
	Incorp.	130	1.3	1.1	1.1	1.3	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

DELAWARE

Crops Included:

Barley
Corn
Forages
Horticulture
Peach, Nectarine, Cherry, Plum
Rye
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
DELAWARE ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	57	3.3	3.3	3.3	3.5	3.5	3.5
	Surface	81	4.5	4.5	4.5	4.8	4.8	4.8
	Incorp.	57	2.9	2.9	2.9	2.9	2.9	2.9
	Incorp.	81	4.2	4.1	4.1	4.2	4.1	4.1
Anaerobic	Surface	57	3.0	3.0	3.0	3.2	3.2	3.2
	Surface	81	4.1	4.1	4.1	4.4	4.4	4.4
	Incorp.	57	2.7	2.3	2.3	2.7	2.3	2.3
	Incorp.	81	3.8	3.3	3.3	3.8	3.3	3.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
DELAWARE ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	102	4.3	4.3	4.3	4.6	4.6	4.6
	Surface	146	5.9	5.9	5.9	6.2	6.2	6.2
	Incorp.	102	3.8	3.7	3.7	3.8	3.7	3.7
	Incorp.	146	5.4	5.3	5.3	5.4	5.4	5.3
Anaerobic	Surface	102	3.9	3.9	3.9	4.2	4.2	4.2
	Surface	146	5.4	5.4	5.4	5.7	5.7	5.7
	Incorp.	102	3.5	3.0	3.0	3.5	3.0	3.0
	Incorp.	146	4.9	4.3	4.2	4.9	4.3	4.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
DELAWARE ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.6	0.6	0.6	0.8	0.8	0.8
¦	Surface	4	0.7	0.7	0.7	0.9	0.9	0.9
¦	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
¦	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	3	0.6	0.6	0.6	0.8	0.8	0.8
¦	Surface	4	0.7	0.7	0.7	0.9	0.9	0.9
¦	Incorp.	3	0.3	0.2	0.2	0.3	0.2	0.2
¦	Incorp.	4	0.4	0.3	0.3	0.4	0.4	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
DELAWARE ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.7	3.7	3.7	3.9	3.9	3.9
¦	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.4	3.4	3.4	3.6	3.6	3.6
¦	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
DELAWARE ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.4	2.4	2.4	2.6	2.6	2.6
	Surface	130	3.0	3.0	3.0	3.2	3.2	3.2
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.2	2.2	2.2	2.4	2.4	2.4
	Surface	130	2.8	2.8	2.8	3.0	3.0	3.0
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
DELAWARE ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	35	1.4	1.4	1.4	1.7	1.7	1.7
	Surface	50	1.9	1.9	1.9	2.1	2.1	2.1
	Incorp.	35	1.1	1.1	1.1	1.1	1.1	1.1
	Incorp.	50	1.6	1.6	1.6	1.6	1.6	1.6
Anaerobic	Surface	35	1.3	1.3	1.3	1.6	1.6	1.6
	Surface	50	1.8	1.8	1.8	2.0	2.0	2.0
	Incorp.	35	1.0	0.9	0.9	1.0	0.9	0.9
	Incorp.	50	1.4	1.3	1.2	1.4	1.3	1.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
DELAWARE ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	29	3.8	3.8	3.8	4.1	4.1	4.1
	Surface	41	5.3	5.3	5.3	5.6	5.6	5.6
	Incorp.	29	3.4	3.4	3.4	3.4	3.4	3.4
	Incorp.	41	4.9	4.8	4.8	4.9	4.8	4.8
Anaerobic	Surface	29	3.5	3.5	3.5	3.8	3.8	3.8
	Surface	41	4.9	4.9	4.9	5.2	5.2	5.2
	Incorp.	29	3.1	2.7	2.7	3.1	2.7	2.7
	Incorp.	41	4.4	3.9	3.8	4.4	3.9	3.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
DELAWARE ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	40	1.7	1.7	1.7	1.9	1.9	1.9
	Surface	57	2.3	2.3	2.3	2.5	2.5	2.5
	Incorp.	40	1.4	1.4	1.4	1.4	1.4	1.4
	Incorp.	57	2.0	1.9	1.9	2.0	1.9	1.9
Anaerobic	Surface	40	1.6	1.6	1.6	1.8	1.8	1.8
	Surface	57	2.1	2.1	2.1	2.3	2.3	2.3
	Incorp.	40	1.3	1.1	1.1	1.3	1.1	1.1
	Incorp.	57	1.8	1.6	1.5	1.8	1.6	1.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

FLORIDA

Crops Included:

Citrus
Corn
Cotton
Forages
Horticulture
Soybeans

Annual Sludge Application Rate, dry tons/acre *
FLORIDA ----- CITRUS

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	4.4	4.4	4.4	4.7	4.7	4.7
	Incorp.	3.9	3.9	3.9	3.9	3.9	3.9
Anaerobic	Surface	4.0	4.0	4.0	4.3	4.3	4.3
	Incorp.	3.6	3.1	3.1	3.6	3.1	3.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
FLORIDA ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	67	3.3	3.3	3.3	3.9	3.9	3.9
	Surface	96	4.4	4.4	4.4	4.9	4.9	4.9
	Incorp.	67	2.5	2.5	2.5	2.5	2.5	2.5
	Incorp.	96	3.6	3.5	3.5	3.6	3.5	3.5
Anaerobic	Surface	67	3.1	3.1	3.1	3.6	3.6	3.6
	Surface	96	4.0	4.0	4.0	4.6	4.6	4.6
	Incorp.	67	2.3	2.0	2.0	2.3	2.0	2.0
	Incorp.	96	3.3	2.8	2.8	3.3	2.8	2.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
FLORIDA ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	627	2.4	2.4	2.4	2.9	2.9	2.9
	Surface	896	3.0	3.0	3.0	3.6	3.6	3.6
	Incorp.	627	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	896	2.3	2.2	2.2	2.3	2.2	2.2
Anaerobic	Surface	627	2.2	2.2	2.2	2.8	2.8	2.8
	Surface	896	2.8	2.8	2.8	3.4	3.4	3.4
	Incorp.	627	1.4	1.3	1.2	1.4	1.3	1.2
	Incorp.	896	2.0	1.8	1.8	2.1	1.8	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
FLORIDA ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.8	0.8	0.8	1.2	1.2	1.2
	Surface	4	1.0	1.0	1.0	1.3	1.3	1.3
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	3	0.8	0.8	0.8	1.2	1.2	1.2
	Surface	4	0.9	0.9	0.9	1.3	1.3	1.3
	Incorp.	3	0.3	0.3	0.2	0.3	0.3	0.3
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
FLORIDA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.9	3.9	3.9	4.2	4.2	4.2
¦	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.6	3.6	3.6	3.9	3.9	3.9
¦	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
FLORIDA ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	26	3.8	3.8	3.8	4.3	4.3	4.3
¦	Surface	37	5.1	5.1	5.1	5.6	5.6	5.6
¦	Incorp.	26	3.1	3.0	3.0	3.1	3.0	3.0
¦	Incorp.	37	4.4	4.3	4.3	4.4	4.3	4.3
Anaerobic	Surface	26	3.5	3.5	3.5	4.1	4.1	4.1
¦	Surface	37	4.7	4.7	4.7	5.2	5.2	5.2
¦	Incorp.	26	2.8	2.4	2.4	2.8	2.4	2.4
¦	Incorp.	37	4.0	3.5	3.4	4.0	3.5	3.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

GEORGIA

Crops Included:

Apples
Corn
Cotton
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rye
Sorghum
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
GEORGIA ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.3	3.3	3.3	3.6	3.6	3.6
	Surface	130	4.1	4.1	4.1	4.4	4.4	4.4
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	3.0	3.0	3.0	3.3	3.3	3.3
	Surface	130	3.8	3.8	3.8	4.1	4.1	4.1
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
GEORGIA ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	85	3.9	3.9	3.9	4.4	4.4	4.4
	Surface	121	5.3	5.3	5.3	5.8	5.8	5.8
	Incorp.	85	3.2	3.1	3.1	3.2	3.1	3.1
	Incorp.	121	4.5	4.5	4.5	4.5	4.5	4.5
Anaerobic	Surface	85	3.6	3.6	3.6	4.1	4.1	4.1
	Surface	121	4.8	4.8	4.8	5.4	5.4	5.4
	Incorp.	85	2.9	2.5	2.5	2.9	2.5	2.5
	Incorp.	121	4.1	3.6	3.5	4.1	3.6	3.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
GEORGIA ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	714	2.5	2.5	2.5	3.1	3.1	3.1
	Surface	1020	3.3	3.3	3.3	3.8	3.8	3.8
	Incorp.	714	1.8	1.8	1.8	1.8	1.8	1.8
	Incorp.	1020	2.6	2.5	2.5	2.6	2.5	2.5
Anaerobic	Surface	714	2.4	2.4	2.4	2.9	2.9	2.9
	Surface	1020	3.1	3.1	3.1	3.6	3.6	3.6
	Incorp.	714	1.6	1.4	1.4	1.6	1.4	1.4
	Incorp.	1020	2.3	2.0	2.0	2.3	2.0	2.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
GEORGIA ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	2	0.8	0.8	0.8	1.1	1.1	1.1
	Surface	3	0.9	0.9	0.9	1.2	1.2	1.2
	Incorp.	2	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	3	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	2	0.7	0.7	0.7	1.1	1.1	1.1
	Surface	3	0.8	0.8	0.8	1.2	1.2	1.2
	Incorp.	2	0.3	0.2	0.2	0.3	0.2	0.2
	Incorp.	3	0.4	0.3	0.3	0.4	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
GEORGIA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.9	3.9	3.9	4.2	4.2	4.2
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.5	3.5	3.5	3.8	3.8	3.8
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
GEORGIA ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	61	2.1	2.1	2.1	2.5	2.5	2.5
	Surface	87	2.8	2.8	2.8	3.1	3.1	3.1
	Incorp.	61	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	87	2.3	2.2	2.2	2.3	2.2	2.2
Anaerobic	Surface	61	2.0	2.0	2.0	2.3	2.3	2.3
	Surface	87	2.6	2.6	2.6	2.9	2.9	2.9
	Incorp.	61	1.4	1.3	1.2	1.4	1.3	1.2
	Incorp.	87	2.0	1.8	1.8	2.1	1.8	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
GEORGIA ----- PEACH,NECTARINE,CHERRY,PLUM

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.6	2.6	2.6	2.9	2.9	2.9
:	Surface	130	3.2	3.2	3.2	3.5	3.5	3.5
:	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
:	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.8
Anaerobic	Surface	100	2.4	2.4	2.4	2.7	2.7	2.7
:	Surface	130	3.0	3.0	3.0	3.3	3.3	3.3
:	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
:	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
GEORGIA ----- RYE

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	26	1.3	1.3	1.3	1.7	1.7	1.7
:	Surface	37	1.7	1.7	1.7	2.1	2.1	2.1
:	Incorp.	26	0.8	0.8	0.8	0.8	0.8	0.8
:	Incorp.	37	1.2	1.2	1.2	1.2	1.2	1.2
Anaerobic	Surface	26	1.3	1.3	1.3	1.6	1.6	1.6
:	Surface	37	1.6	1.6	1.6	2.0	2.0	2.0
:	Incorp.	26	0.7	0.7	0.6	0.8	0.7	0.7
:	Incorp.	37	1.1	0.9	0.9	1.1	0.9	0.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
GEORGIA ----- SORGHUM

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	42	2.2	2.2	2.2	2.7	2.7	2.7
	Surface	60	2.8	2.8	2.8	3.3	3.3	3.3
	Incorp.	42	1.5	1.4	1.4	1.5	1.4	1.4
	Incorp.	60	2.1	2.0	2.0	2.1	2.0	2.0
Anaerobic	Surface	42	2.0	2.0	2.0	2.6	2.6	2.6
	Surface	60	2.6	2.6	2.6	3.1	3.1	3.1
	Incorp.	42	1.3	1.2	1.1	1.3	1.2	1.1
	Incorp.	60	1.9	1.6	1.6	1.9	1.7	1.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
GEORGIA ----- SOYBEANS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	27	3.9	3.9	3.9	4.4	4.4	4.4
	Surface	39	5.2	5.2	5.2	5.7	5.7	5.7
	Incorp.	27	3.2	3.1	3.1	3.2	3.1	3.1
	Incorp.	39	4.5	4.5	4.5	4.5	4.5	4.5
Anaerobic	Surface	27	3.6	3.6	3.6	4.1	4.1	4.1
	Surface	39	4.8	4.8	4.8	5.3	5.3	5.3
	Incorp.	27	2.9	2.5	2.5	2.9	2.5	2.5
	Incorp.	39	4.1	3.6	3.5	4.1	3.6	3.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
GEORGIA ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	43	2.0	2.0	2.0	2.4	2.4	2.4
	Surface	61	2.6	2.6	2.6	3.0	3.0	3.0
	Incorp.	43	1.5	1.5	1.5	1.5	1.5	1.5
	Incorp.	61	2.1	2.1	2.1	2.1	2.1	2.1
Anaerobic	Surface	43	1.9	1.9	1.9	2.2	2.2	2.2
	Surface	61	2.4	2.4	2.4	2.8	2.8	2.8
	Incorp.	43	1.3	1.2	1.2	1.4	1.2	1.2
	Incorp.	61	1.9	1.7	1.7	1.9	1.7	1.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

IDAHO

Crops Included:

Barley
Corn
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Tree Farming
Wheat

Annual Sludge Application Rate, dry tons/acre *
IDAHO ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	69	3.6	3.6	3.6	3.6	3.6	3.6
	Surface	99	5.1	5.1	5.1	5.1	5.1	5.1
	Incorp.	69	3.6	3.5	3.5	3.6	3.5	3.5
	Incorp.	99	5.1	5.0	5.0	5.1	5.0	5.0
Anaerobic	Surface	69	3.3	3.3	3.3	3.3	3.3	3.3
	Surface	99	4.7	4.7	4.7	4.7	4.7	4.7
	Incorp.	69	3.2	2.8	2.8	3.2	2.8	2.8
	Incorp.	99	4.6	4.0	4.0	4.6	4.0	4.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
IDAHO ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	120	4.5	4.5	4.5	4.5	4.5	4.5
	Surface	171	6.4	6.4	6.4	6.5	6.5	6.5
	Incorp.	120	4.5	4.4	4.4	4.5	4.4	4.4
	Incorp.	171	6.4	6.3	6.3	6.4	6.3	6.3
Anaerobic	Surface	120	4.1	4.1	4.1	4.1	4.1	4.1
	Surface	171	5.9	5.9	5.9	5.9	5.9	5.9
	Incorp.	120	4.1	3.6	3.5	4.1	3.6	3.5
	Incorp.	171	5.8	5.1	5.0	5.8	5.1	5.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
IDAHO ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.4	0.4	0.4	0.4	0.4	0.4
	Surface	5	0.6	0.6	0.6	0.6	0.6	0.6
	Incorp.	3	0.4	0.4	0.4	0.4	0.4	0.4
	Incorp.	5	0.6	0.6	0.6	0.6	0.6	0.6
Anaerobic	Surface	3	0.4	0.4	0.4	0.4	0.4	0.4
	Surface	5	0.5	0.5	0.5	0.6	0.6	0.6
	Incorp.	3	0.4	0.3	0.3	0.4	0.3	0.3
	Incorp.	5	0.5	0.5	0.4	0.5	0.5	0.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
IDAHO ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.5	3.5	3.5	3.5	3.5	3.5
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.2	3.2	3.2	3.2	3.2	3.2
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
IDAHO ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	76	2.0	2.0	2.0	2.0	2.0	2.0
	Surface	109	2.8	2.8	2.8	2.9	2.9	2.9
	Incorp.	76	2.0	1.9	1.9	2.0	1.9	1.9
	Incorp.	109	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	76	1.8	1.8	1.8	1.8	1.8	1.8
	Surface	109	2.6	2.6	2.6	2.6	2.6	2.6
	Incorp.	76	1.8	1.6	1.5	1.8	1.6	1.5
	Incorp.	109	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
IDAHO ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.2	2.2	2.2	2.2	2.2	2.2
	Surface	130	2.8	2.8	2.8	2.8	2.8	2.8
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.0	2.0	2.0	2.0	2.0	2.0
	Surface	130	2.6	2.6	2.6	2.6	2.6	2.6
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre
IDAHO ----- TREE FARMING *

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	5.8	5.8	5.8	5.8	5.8	5.8
	Incorp.	5.7	5.6	5.6	5.7	5.6	5.6
Anaerobic	Surface	5.2	5.2	5.2	5.3	5.3	5.3
	Incorp.	5.2	4.6	4.5	5.2	4.6	4.5

* Includes white pines, Douglas-fir, southern pine, spruce, aspen, oak, and hickory.

Annual Sludge Application Rate, dry tons/acre *
IDAHO ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	70	2.4	2.4	2.4	2.5	2.5	2.5
	Surface	100	3.5	3.5	3.5	3.5	3.5	3.5
	Incorp.	70	2.4	2.4	2.4	2.4	2.4	2.4
	Incorp.	100	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	70	2.2	2.2	2.2	2.2	2.2	2.2
	Surface	100	3.2	3.2	3.2	3.2	3.2	3.2
	Incorp.	70	2.2	1.9	1.9	2.2	1.9	1.9
	Incorp.	100	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

ILLINOIS

Crops Included:

- Apples
- Corn
- Forages
- Horticulture
- Oats
- Peach, Nectarine, Cherry, Plum
- Rye
- Sorghum
- Soybeans
- Wheat

Annual Sludge Application Rate, dry tons/acre *
ILLINOIS ----- APPLES

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.1	3.1	3.1	3.3	3.3	3.3
	Surface	130	4.0	4.0	4.0	4.2	4.2	4.2
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.9	2.9	2.9	3.0	3.0	3.0
	Surface	130	3.6	3.6	3.6	3.8	3.8	3.8
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ILLINOIS ----- CORN

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	131	5.3	5.3	5.3	5.7	5.7	5.7
	Surface	187	7.4	7.4	7.4	7.8	7.8	7.8
	Incorp.	131	4.9	4.8	4.8	4.9	4.8	4.8
	Incorp.	187	7.0	6.9	6.9	7.0	6.9	6.9
Anaerobic	Surface	131	4.9	4.9	4.9	5.2	5.2	5.2
	Surface	187	6.8	6.8	6.8	7.1	7.1	7.1
	Incorp.	131	4.4	3.9	3.8	4.4	3.9	3.8
	Incorp.	187	6.3	5.5	5.4	6.3	5.5	5.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ILLINOIS ----- FORAGES

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield t/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.7	0.7	0.7	0.9	0.9	0.9
	Surface	5	0.8	0.8	0.8	1.0	1.0	1.0
	Incorp.	3	0.4	0.4	0.4	0.4	0.4	0.4
	Incorp.	5	0.5	0.5	0.5	0.5	0.5	0.5
Anaerobic	Surface	3	0.6	0.6	0.6	0.8	0.8	0.8
	Surface	5	0.8	0.8	0.8	1.0	1.0	1.0
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	5	0.5	0.4	0.4	0.5	0.4	0.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre*
ILLINOIS ----- HORTICULTURE

		Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.7	3.7	3.7	3.9	3.9	3.9
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.4	3.4	3.4	3.6	3.6	3.6
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ILLINOIS ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	66	2.0	2.0	2.0	2.3	2.3	2.3
	Surface	94	2.8	2.8	2.8	3.0	3.0	3.0
	Incorp.	66	1.7	1.7	1.7	1.7	1.7	1.7
	Incorp.	94	2.4	2.4	2.4	2.4	2.4	2.4
Anaerobic	Surface	66	1.9	1.9	1.9	2.1	2.1	2.1
	Surface	94	2.5	2.5	2.5	2.8	2.8	2.8
	Incorp.	66	1.6	1.4	1.3	1.6	1.4	1.3
	Incorp.	94	2.2	1.9	1.9	2.2	1.9	1.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ILLINOIS ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.4	2.4	2.4	2.6	2.6	2.6
	Surface	130	3.0	3.0	3.0	3.2	3.2	3.2
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.2	2.2	2.2	2.4	2.4	2.4
	Surface	130	2.8	2.8	2.8	3.0	3.0	3.0
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ILLINOIS ----- RYE

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	28	1.2	1.2	1.2	1.4	1.4	1.4
	Surface	40	1.6	1.6	1.6	1.8	1.8	1.8
	Incorp.	28	0.9	0.9	0.9	0.9	0.9	0.9
	Incorp.	40	1.3	1.2	1.2	1.3	1.2	1.2
Anaerobic	Surface	28	1.1	1.1	1.1	1.4	1.4	1.4
	Surface	40	1.5	1.5	1.5	1.7	1.7	1.7
	Incorp.	28	0.8	0.7	0.7	0.8	0.7	0.7
	Incorp.	40	1.1	1.0	1.0	1.2	1.0	1.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ILLINOIS ----- SORGHUM

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	78	3.1	3.1	3.1	3.5	3.5	3.5
	Surface	111	4.3	4.3	4.3	4.6	4.6	4.6
	Incorp.	78	2.7	2.6	2.6	2.7	2.6	2.6
	Incorp.	111	3.8	3.8	3.8	3.8	3.8	3.8
Anaerobic	Surface	78	2.9	2.9	2.9	3.2	3.2	3.2
	Surface	111	3.9	3.9	3.9	4.3	4.3	4.3
	Incorp.	78	2.4	2.1	2.1	2.4	2.1	2.1
	Incorp.	111	3.5	3.0	3.0	3.5	3.1	3.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ILLINOIS ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	39	5.0	5.0	5.0	5.3	5.3	5.3
	Surface	56	7.0	7.0	7.0	7.3	7.3	7.3
	Incorp.	39	4.6	4.5	4.5	4.6	4.5	4.5
	Incorp.	56	6.6	6.4	6.4	6.6	6.5	6.4
Anaerobic	Surface	39	4.6	4.6	4.6	4.9	4.9	4.9
	Surface	56	6.4	6.4	6.4	6.7	6.7	6.7
	Incorp.	39	4.2	3.6	3.6	4.2	3.6	3.6
	Incorp.	56	6.0	5.2	5.1	6.0	5.2	5.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
ILLINOIS ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	50	2.0	2.0	2.0	2.3	2.3	2.3
	Surface	71	2.8	2.8	2.8	3.0	3.0	3.0
	Incorp.	50	1.7	1.7	1.7	1.7	1.7	1.7
	Incorp.	71	2.5	2.4	2.4	2.5	2.4	2.4
Anaerobic	Surface	50	1.9	1.9	1.9	2.1	2.1	2.1
	Surface	71	2.6	2.6	2.6	2.8	2.8	2.8
	Incorp.	50	1.6	1.4	1.3	1.6	1.4	1.3
	Incorp.	71	2.2	2.0	1.9	2.2	2.0	1.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

INDIANA

Crops Included:

Apples
Corn
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rye
Sorghum
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
INDIANA ----- APPLES

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.1	3.1	3.1	3.2	3.2	3.2
	Surface	130	3.9	3.9	3.9	4.1	4.1	4.1
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.8	2.8	2.8	3.0	3.0	3.0
	Surface	130	3.6	3.6	3.6	3.8	3.8	3.8
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
INDIANA ----- CORN

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	126	5.1	5.1	5.1	5.4	5.4	5.4
	Surface	180	7.1	7.1	7.1	7.4	7.4	7.4
	Incorp.	126	4.7	4.6	4.6	4.7	4.6	4.6
	Incorp.	180	6.7	6.6	6.6	6.7	6.6	6.6
Anaerobic	Surface	126	4.7	4.7	4.7	5.0	5.0	5.0
	Surface	180	6.5	6.5	6.5	6.8	6.8	6.8
	Incorp.	126	4.3	3.7	3.7	4.3	3.7	3.7
	Incorp.	180	6.1	5.3	5.2	6.1	5.3	5.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
INDIANA ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.6	0.6	0.6	0.8	0.8	0.8
	Surface	4	0.8	0.8	0.8	1.0	1.0	1.0
	Incorp.	3	0.4	0.4	0.4	0.4	0.4	0.4
	Incorp.	4	0.5	0.5	0.5	0.5	0.5	0.5
Anaerobic	Surface	3	0.6	0.6	0.6	0.8	0.8	0.8
	Surface	4	0.7	0.7	0.7	0.9	0.9	0.9
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.5	0.4	0.4	0.5	0.4	0.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
INDIANA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.7	3.7	3.7	3.8	3.8	3.8
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.4	3.4	3.4	3.5	3.5	3.5
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
INDIANA ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	65	2.0	2.0	2.0	2.2	2.2	2.2
	Surface	93	2.7	2.7	2.7	2.9	2.9	2.9
	Incorp.	65	1.7	1.7	1.7	1.7	1.7	1.7
	Incorp.	93	2.4	2.4	2.4	2.4	2.4	2.4
Anaerobic	Surface	65	1.8	1.8	1.8	2.0	2.0	2.0
	Surface	93	2.5	2.5	2.5	2.7	2.7	2.7
	Incorp.	65	1.5	1.3	1.3	1.5	1.3	1.3
	Incorp.	93	2.2	1.9	1.9	2.2	1.9	1.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
INDIANA ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.4	2.4	2.4	2.5	2.5	2.5
	Surface	130	3.0	3.0	3.0	3.2	3.2	3.2
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.2	2.2	2.2	2.3	2.3	2.3
	Surface	130	2.8	2.8	2.8	2.9	2.9	2.9
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
INDIANA ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	27	1.1	1.1	1.1	1.3	1.3	1.3
	Surface	39	1.5	1.5	1.5	1.7	1.7	1.7
	Incorp.	27	0.9	0.8	0.8	0.9	0.8	0.8
	Incorp.	39	1.2	1.2	1.2	1.2	1.2	1.2
Anaerobic	Surface	27	1.1	1.1	1.1	1.3	1.3	1.3
	Surface	39	1.4	1.4	1.4	1.6	1.6	1.6
	Incorp.	27	0.8	0.7	0.7	0.8	0.7	0.7
	Incorp.	39	1.1	1.0	0.9	1.1	1.0	1.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
INDIANA ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	73	2.9	2.9	2.9	3.2	3.2	3.2
	Surface	104	4.0	4.0	4.0	4.3	4.3	4.3
	Incorp.	73	2.5	2.5	2.5	2.5	2.5	2.5
	Incorp.	104	3.6	3.5	3.5	3.6	3.5	3.5
Anaerobic	Surface	73	2.7	2.7	2.7	3.0	3.0	3.0
	Surface	104	3.7	3.7	3.7	3.9	3.9	3.9
	Incorp.	73	2.3	2.0	2.0	2.3	2.0	2.0
	Incorp.	104	3.3	2.9	2.8	3.3	2.9	2.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
INDIANA ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	39	5.0	5.0	5.0	5.2	5.2	5.2
	Surface	56	6.9	6.9	6.9	7.2	7.2	7.2
	Incorp.	39	4.6	4.5	4.5	4.6	4.5	4.5
	Incorp.	56	6.6	6.4	6.4	6.6	6.5	6.4
Anaerobic	Surface	39	4.5	4.5	4.5	4.8	4.8	4.8
	Surface	56	6.3	6.3	6.3	6.6	6.6	6.6
	Incorp.	39	4.2	3.6	3.6	4.2	3.6	3.6
	Incorp.	56	6.0	5.2	5.1	6.0	5.2	5.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
INDIANA ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	51	2.0	2.0	2.0	2.2	2.2	2.2
	Surface	73	2.8	2.8	2.8	3.0	3.0	3.0
	Incorp.	51	1.8	1.7	1.7	1.8	1.7	1.7
	Incorp.	73	2.5	2.5	2.5	2.5	2.5	2.5
Anaerobic	Surface	51	1.9	1.9	1.9	2.1	2.1	2.1
	Surface	73	2.6	2.6	2.6	2.8	2.8	2.8
	Incorp.	51	1.6	1.4	1.4	1.6	1.4	1.4
	Incorp.	73	2.3	2.0	2.0	2.3	2.0	2.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

IOWA

Crops Included:

Apples
Corn
Forages
Horticulture
Oats
Rye
Sorghum
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
IOWA ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.1	3.1	3.1	3.2	3.2	3.2
	Surface	130	3.9	3.9	3.9	4.1	4.1	4.1
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.8	2.8	2.8	3.0	3.0	3.0
	Surface	130	3.6	3.6	3.6	3.8	3.8	3.8
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
IOWA ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	125	5.1	5.1	5.1	5.3	5.3	5.3
	Surface	179	7.0	7.0	7.0	7.3	7.3	7.3
	Incorp.	125	4.7	4.6	4.6	4.7	4.6	4.6
	Incorp.	179	6.7	6.6	6.5	6.7	6.6	6.5
Anaerobic	Surface	125	4.6	4.6	4.6	4.9	4.9	4.9
	Surface	179	6.4	6.4	6.4	6.7	6.7	6.7
	Incorp.	125	4.2	3.7	3.6	4.2	3.7	3.6
	Incorp.	179	6.1	5.3	5.2	6.1	5.3	5.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
IOWA ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	4	0.7	0.7	0.7	0.9	0.9	0.9
	Surface	5	0.9	0.9	0.9	1.1	1.1	1.1
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4
	Incorp.	5	0.6	0.6	0.6	0.6	0.6	0.6
Anaerobic	Surface	4	0.6	0.6	0.6	0.8	0.8	0.8
	Surface	5	0.8	0.8	0.8	1.0	1.0	1.0
	Incorp.	4	0.4	0.3	0.3	0.4	0.3	0.3
	Incorp.	5	0.6	0.5	0.5	0.6	0.5	0.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
IOWA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.7	3.7	3.7	3.8	3.8	3.8
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.4	3.4	3.4	3.5	3.5	3.5
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
IOWA ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	62	1.9	1.9	1.9	2.1	2.1	2.1
	Surface	89	2.6	2.6	2.6	2.8	2.8	2.8
	Incorp.	62	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	89	2.3	2.3	2.2	2.3	2.3	2.2
Anaerobic	Surface	62	1.7	1.7	1.7	1.9	1.9	1.9
	Surface	89	2.4	2.4	2.4	2.6	2.6	2.6
	Incorp.	62	1.5	1.3	1.2	1.5	1.3	1.3
	Incorp.	89	2.1	1.8	1.8	2.1	1.8	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
IOWA ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	33	1.3	1.3	1.3	1.5	1.5	1.5
	Surface	47	1.8	1.8	1.8	2.0	2.0	2.0
	Incorp.	33	1.0	1.0	1.0	1.0	1.0	1.0
	Incorp.	47	1.5	1.5	1.5	1.5	1.5	1.5
Anaerobic	Surface	33	1.2	1.2	1.2	1.4	1.4	1.4
	Surface	47	1.6	1.6	1.6	1.8	1.8	1.8
	Incorp.	33	0.9	0.8	0.8	1.0	0.8	0.8
	Incorp.	47	1.4	1.2	1.2	1.4	1.2	1.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
IOWA ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	80	3.1	3.1	3.1	3.4	3.4	3.4
	Surface	114	4.3	4.3	4.3	4.6	4.6	4.6
	Incorp.	80	2.8	2.7	2.7	2.8	2.7	2.7
	Incorp.	114	3.9	3.9	3.9	3.9	3.9	3.9
Anaerobic	Surface	80	2.9	2.9	2.9	3.2	3.2	3.2
	Surface	114	4.0	4.0	4.0	4.3	4.3	4.3
	Incorp.	80	2.5	2.2	2.1	2.5	2.2	2.1
	Incorp.	114	3.6	3.1	3.1	3.6	3.1	3.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
IOWA ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	40	5.1	5.1	5.1	5.3	5.3	5.3
	Surface	57	7.1	7.1	7.1	7.4	7.4	7.4
	Incorp.	40	4.7	4.6	4.6	4.7	4.6	4.6
	Incorp.	57	6.7	6.6	6.6	6.7	6.6	6.6
Anaerobic	Surface	40	4.6	4.6	4.6	4.9	4.9	4.9
	Surface	57	6.5	6.5	6.5	6.7	6.7	6.7
	Incorp.	40	4.3	3.7	3.7	4.3	3.7	3.7
	Incorp.	57	6.1	5.3	5.2	6.1	5.3	5.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
IOWA ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	39	1.6	1.6	1.6	1.8	1.8	1.8
	Surface	56	2.2	2.2	2.2	2.4	2.4	2.4
	Incorp.	39	1.3	1.3	1.3	1.3	1.3	1.3
	Incorp.	56	1.9	1.9	1.9	1.9	1.9	1.9
Anaerobic	Surface	39	1.5	1.5	1.5	1.7	1.7	1.7
	Surface	56	2.0	2.0	2.0	2.2	2.2	2.2
	Incorp.	39	1.2	1.1	1.0	1.2	1.1	1.1
	Incorp.	56	1.7	1.5	1.5	1.7	1.5	1.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

KANSAS (W)

Crops Included:

Apples
Barley
Corn
Cotton
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rye
Sorghum
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
KANSAS(W) ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.0	3.0	3.0	3.1	3.1	3.1
	Surface	130	3.9	3.9	3.9	4.0	4.0	4.0
	incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.8	2.8	2.8	2.9	2.9	2.9
	Surface	130	3.5	3.5	3.5	3.7	3.7	3.7
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(W) ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	51	2.8	2.8	2.8	3.0	3.0	3.0
	Surface	73	4.0	4.0	4.0	4.1	4.1	4.1
	Incorp.	51	2.6	2.6	2.6	2.6	2.6	2.6
	Incorp.	73	3.8	3.7	3.7	3.8	3.7	3.7
Anaerobic	Surface	51	2.6	2.6	2.6	2.7	2.7	2.7
	Surface	73	3.6	3.6	3.6	3.8	3.8	3.8
	Incorp.	51	2.4	2.1	2.0	2.4	2.1	2.1
	Incorp.	73	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(W) ----- CORN

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	126	5.0	5.0	5.0	5.2	5.2	5.2
	Surface	180	7.0	7.0	7.0	7.2	7.2	7.2
	Incorp.	126	4.7	4.6	4.6	4.7	4.6	4.6
	Incorp.	180	6.7	6.6	6.6	6.7	6.6	6.6
Anaerobic	Surface	126	4.5	4.5	4.5	4.7	4.7	4.7
	Surface	180	6.4	6.4	6.4	6.6	6.6	6.6
	Incorp.	126	4.3	3.7	3.7	4.3	3.7	3.7
	Incorp.	180	6.1	5.3	5.2	6.1	5.3	5.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(W) ----- COTTON

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield lb/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	240	0.9	0.9	0.9	1.1	1.1	1.1
	Surface	343	1.1	1.1	1.1	1.3	1.3	1.3
	Incorp.	240	0.6	0.6	0.6	0.6	0.6	0.6
	Incorp.	343	0.9	0.8	0.8	0.9	0.9	0.9
Anaerobic	Surface	240	0.8	0.8	0.8	1.0	1.0	1.0
	Surface	343	1.1	1.1	1.1	1.2	1.2	1.2
	Incorp.	240	0.5	0.5	0.5	0.6	0.5	0.5
	Incorp.	343	0.8	0.7	0.7	0.8	0.7	0.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(W) ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.5	0.5	0.5	0.6	0.6	0.6
	Surface	4	0.6	0.6	0.6	0.7	0.7	0.7
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	3	0.5	0.5	0.5	0.6	0.6	0.6
	Surface	4	0.6	0.6	0.6	0.7	0.7	0.7
	Incorp.	3	0.3	0.2	0.2	0.3	0.2	0.2
	Incorp.	4	0.4	0.3	0.3	0.4	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(W) ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.6	3.6	3.6	3.7	3.7	3.7
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.3	3.3	3.3	3.4	3.4	3.4
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(W) ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	50	1.5	1.5	1.5	1.6	1.6	1.6
	Surface	71	2.0	2.0	2.0	2.2	2.2	2.2
	Incorp.	50	1.3	1.3	1.3	1.3	1.3	1.3
	Incorp.	71	1.8	1.8	1.8	1.8	1.8	1.8
Anaerobic	Surface	50	1.4	1.4	1.4	1.5	1.5	1.5
	Surface	71	1.9	1.9	1.9	2.0	2.0	2.0
	Incorp.	50	1.2	1.0	1.0	1.2	1.0	1.0
	Incorp.	71	1.7	1.5	1.4	1.7	1.5	1.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(W) ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	100	2.3	2.3	2.3	2.4	2.4	2.4
	Surface	130	2.9	2.9	2.9	3.1	3.1	3.1
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.1	2.1	2.1	2.2	2.2	2.2
	Surface	130	2.7	2.7	2.7	2.8	2.8	2.8
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(W) ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	24	0.9	0.9	0.9	1.1	1.1	1.1
	Surface	34	1.3	1.3	1.3	1.4	1.4	1.4
	Incorp.	24	0.8	0.7	0.7	0.8	0.7	0.7
	Incorp.	34	1.1	1.1	1.1	1.1	1.1	1.1
Anaerobic	Surface	24	0.9	0.9	0.9	1.0	1.0	1.0
	Surface	34	1.2	1.2	1.2	1.3	1.3	1.3
	Incorp.	24	0.7	0.6	0.6	0.7	0.6	0.6
	Incorp.	34	1.0	0.9	0.8	1.0	0.9	0.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(W) ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	67	2.6	2.6	2.6	2.8	2.8	2.8
	Surface	96	3.6	3.6	3.6	3.8	3.8	3.8
	Incorp.	67	2.3	2.3	2.3	2.3	2.3	2.3
	Incorp.	96	3.3	3.2	3.2	3.3	3.2	3.2
Anaerobic	Surface	67	2.4	2.4	2.4	2.6	2.6	2.6
	Surface	96	3.3	3.3	3.3	3.5	3.5	3.5
	Incorp.	67	2.1	1.8	1.8	2.1	1.8	1.8
	Incorp.	96	3.0	2.6	2.6	3.0	2.6	2.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(W) ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	30	3.8	3.8	3.8	4.0	4.0	4.0
	Surface	43	5.3	5.3	5.3	5.5	5.5	5.5
	Incorp.	30	3.5	3.5	3.5	3.5	3.5	3.5
	Incorp.	43	5.0	5.0	4.9	5.0	5.0	4.9
Anaerobic	Surface	30	3.5	3.5	3.5	3.6	3.6	3.6
	Surface	43	4.8	4.8	4.8	5.0	5.0	5.0
	Incorp.	30	3.2	2.8	2.7	3.2	2.8	2.7
	Incorp.	43	4.6	4.0	3.9	4.6	4.0	3.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(W) ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	42	1.6	1.6	1.6	1.8	1.8	1.8
	Surface	60	2.3	2.3	2.3	2.4	2.4	2.4
	Incorp.	42	1.4	1.4	1.4	1.4	1.4	1.4
	Incorp.	60	2.1	2.0	2.0	2.1	2.0	2.0
Anaerobic	Surface	42	1.5	1.5	1.5	1.6	1.6	1.6
	Surface	60	2.1	2.1	2.1	2.2	2.2	2.2
	Incorp.	42	1.3	1.1	1.1	1.3	1.2	1.1
	Incorp.	60	1.9	1.6	1.6	1.9	1.6	1.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

KANSAS (E)

Crops Included:

Apples
Barley
Corn
Cotton
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rye
Sorghum
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
KANSAS(E) ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.1	3.1	3.1	3.3	3.3	3.3
	Surface	130	4.0	4.0	4.0	4.2	4.2	4.2
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.9	2.9	2.9	3.0	3.0	3.0
	Surface	130	3.6	3.6	3.6	3.8	3.8	3.8
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

KANSAS(E) ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	51	3.0	3.0	3.0	3.2	3.2	3.2
	Surface	73	4.1	4.1	4.1	4.3	4.3	4.3
	Incorp.	51	2.6	2.6	2.6	2.6	2.6	2.6
	Incorp.	73	3.8	3.7	3.7	3.8	3.7	3.7
Anaerobic	Surface	51	2.7	2.7	2.7	2.9	2.9	2.9
	Surface	73	3.7	3.7	3.7	4.0	4.0	4.0
	Incorp.	51	2.4	2.1	2.1	2.4	2.1	2.1
	Incorp.	73	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(E) ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	126	5.1	5.1	5.1	5.5	5.5	5.5
	Surface	180	7.2	7.2	7.2	7.5	7.5	7.5
	Incorp.	126	4.7	4.6	4.6	4.7	4.6	4.6
	Incorp.	180	6.7	6.6	6.6	6.7	6.6	6.6
Anaerobic	Surface	126	4.7	4.7	4.7	5.0	5.0	5.0
	Surface	180	6.6	6.6	6.6	6.9	6.9	6.9
	Incorp.	126	4.3	3.7	3.7	4.3	3.7	3.7
	Incorp.	180	6.1	5.3	5.2	6.1	5.3	5.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(E) ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	240	1.1	1.1	1.1	1.4	1.4	1.4
	Surface	343	1.3	1.3	1.3	1.6	1.6	1.6
	Incorp.	240	0.6	0.6	0.6	0.6	0.6	0.6
	Incorp.	343	0.9	0.9	0.9	0.9	0.9	0.9
Anaerobic	Surface	240	1.0	1.0	1.0	1.3	1.3	1.3
	Surface	343	1.2	1.2	1.2	1.6	1.6	1.6
	Incorp.	240	0.6	0.5	0.5	0.6	0.5	0.5
	Incorp.	343	0.8	0.7	0.7	0.8	0.7	0.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(E) ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.6	0.6	0.6	0.8	0.8	0.8
	Surface	4	0.7	0.7	0.7	0.9	0.9	0.9
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	3	0.6	0.6	0.6	0.8	0.8	0.8
	Surface	4	0.7	0.7	0.7	0.9	0.9	0.9
	Incorp.	3	0.3	0.2	0.2	0.3	0.2	0.2
	Incorp.	4	0.4	0.3	0.3	0.4	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(E) ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.7	3.7	3.7	3.9	3.9	3.9
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.4	3.4	3.4	3.6	3.6	3.6
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(E) ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	50	1.6	1.6	1.6	1.8	1.8	1.8
	Surface	71	2.2	2.2	2.2	2.4	2.4	2.4
	Incorp.	50	1.3	1.3	1.3	1.3	1.3	1.3
	Incorp.	71	1.8	1.8	1.8	1.8	1.8	1.8
Anaerobic	Surface	50	1.5	1.5	1.5	1.7	1.7	1.7
	Surface	71	2.0	2.0	2.0	2.2	2.2	2.2
	Incorp.	50	1.2	1.0	1.0	1.2	1.0	1.0
	Incorp.	71	1.7	1.5	1.4	1.7	1.5	1.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(E) ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.4	2.4	2.4	2.6	2.6	2.6
	Surface	130	3.0	3.0	3.0	3.2	3.2	3.2
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.2	2.2	2.2	2.4	2.4	2.4
	Surface	130	2.8	2.8	2.8	3.0	3.0	3.0
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(E) ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	24	1.1	1.1	1.1	1.3	1.3	1.3
	Surface	34	1.4	1.4	1.4	1.6	1.6	1.6
	Incorp.	24	0.8	0.7	0.7	0.8	0.8	0.8
	Incorp.	34	1.1	1.1	1.1	1.1	1.1	1.1
Anaerobic	Surface	24	1.0	1.0	1.0	1.2	1.2	1.2
	Surface	34	1.3	1.3	1.3	1.5	1.5	1.5
	Incorp.	24	0.7	0.6	0.6	0.7	0.6	0.6
	Incorp.	34	1.0	0.9	0.8	1.0	0.9	0.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(E) ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	67	2.8	2.8	2.8	3.1	3.1	3.1
	Surface	96	3.7	3.7	3.7	4.1	4.1	4.1
	Incorp.	67	2.3	2.3	2.3	2.3	2.3	2.3
	Incorp.	96	3.3	3.2	3.2	3.3	3.2	3.2
Anaerobic	Surface	67	2.5	2.5	2.5	2.9	2.9	2.9
	Surface	96	3.4	3.4	3.4	3.8	3.8	3.8
	Incorp.	67	2.1	1.8	1.8	2.1	1.8	1.8
	Incorp.	96	3.0	2.6	2.6	3.0	2.6	2.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(E) ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	30	3.9	3.9	3.9	4.3	4.3	4.3
	Surface	43	5.5	5.5	5.5	5.8	5.8	5.8
	Incorp.	30	3.5	3.5	3.5	3.5	3.5	3.5
	Incorp.	43	5.0	5.0	4.9	5.0	5.0	5.0
Anaerobic	Surface	30	3.6	3.6	3.6	3.9	3.9	3.9
	Surface	43	5.0	5.0	5.0	5.3	5.3	5.3
	Incorp.	30	3.2	2.8	2.7	3.2	2.8	2.8
	Incorp.	43	4.6	4.0	3.9	4.6	4.0	3.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
KANSAS(E) ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	42	1.8	1.8	1.8	2.0	2.0	2.0
	Surface	60	2.4	2.4	2.4	2.6	2.6	2.6
	Incorp.	42	1.4	1.4	1.4	1.4	1.4	1.4
	Incorp.	60	2.1	2.0	2.0	2.1	2.0	2.0
Anaerobic	Surface	42	1.6	1.6	1.6	1.9	1.9	1.9
	Surface	60	2.2	2.2	2.2	2.4	2.4	2.4
	Incorp.	42	1.3	1.2	1.1	1.3	1.2	1.1
	Incorp.	60	1.9	1.6	1.6	1.9	1.6	1.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

LOUISIANA

Crops Included:

Corn
Cotton
Forages
Horticulture
Peach, Nectarine, Cherry, Plum
Rice
Sorghum
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
LOUISIANA ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	90	4.1	4.1	4.1	4.7	4.7	4.7
	Surface	129	5.6	5.6	5.6	6.2	6.2	6.2
	Incorp.	90	3.4	3.3	3.3	3.4	3.3	3.3
	Incorp.	129	4.8	4.7	4.7	4.8	4.7	4.7
Anaerobic	Surface	90	3.8	3.8	3.8	4.4	4.4	4.4
	Surface	129	5.1	5.1	5.1	5.7	5.7	5.7
	Incorp.	90	3.1	2.7	2.6	3.1	2.7	2.6
	Incorp.	129	4.4	3.8	3.7	4.4	3.8	3.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
LOUISIANA ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	702	2.5	2.5	2.5	3.1	3.1	3.1
	Surface	1003	3.3	3.3	3.3	3.9	3.9	3.9
	Incorp.	702	1.8	1.7	1.7	1.8	1.7	1.7
	Incorp.	1003	2.5	2.5	2.5	2.5	2.5	2.5
Anaerobic	Surface	702	2.4	2.4	2.4	3.0	3.0	3.0
	Surface	1003	3.1	3.1	3.1	3.6	3.6	3.6
	Incorp.	702	1.6	1.4	1.4	1.6	1.4	1.4
	Incorp.	1003	2.3	2.0	2.0	2.3	2.0	2.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
LOUISIANA ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.8	0.8	0.8	1.1	1.1	1.1
	Surface	3	0.9	0.9	0.9	1.3	1.3	1.3
	Incorp.	2	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	3	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	2	0.7	0.7	0.7	1.1	1.1	1.1
	Surface	3	0.8	0.8	0.8	1.2	1.2	1.2
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
LOUISIANA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.9	3.9	3.9	4.2	4.2	4.2
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.6	3.6	3.6	3.9	3.9	3.9
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
LOUISIANA ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.6	2.6	2.6	2.9	2.9	2.9
	Surface	130	3.2	3.2	3.2	3.6	3.6	3.6
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.8
Anaerobic	Surface	100	2.4	2.4	2.4	2.7	2.7	2.7
	Surface	130	3.0	3.0	3.0	3.3	3.3	3.3
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
LOUISIANA ----- RICE

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	4160	2.6	2.6	2.6	3.1	3.1	3.1
	Surface	5943	3.5	3.5	3.5	4.0	4.0	4.0
	Incorp.	4160	2.1	2.1	2.1	2.1	2.1	2.1
	Incorp.	5943	3.0	2.9	2.9	3.0	2.9	2.9
Anaerobic	Surface	4160	2.5	2.5	2.5	2.9	2.9	2.9
	Surface	5943	3.3	3.3	3.3	3.7	3.7	3.7
	Incorp.	4160	1.9	1.7	1.6	1.9	1.7	1.6
	Incorp.	5943	2.7	2.4	2.3	2.7	2.4	2.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
LOUISIANA ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	56	2.7	2.7	2.7	3.3	3.3	3.3
	Surface	80	3.5	3.5	3.5	4.1	4.1	4.1
	Incorp.	56	1.9	1.9	1.9	1.9	1.9	1.9
	Incorp.	80	2.8	2.7	2.7	2.8	2.7	2.7
Anaerobic	Surface	56	2.5	2.5	2.5	3.1	3.1	3.1
	Surface	80	3.3	3.3	3.3	3.9	3.9	3.9
	Incorp.	56	1.8	1.5	1.5	1.8	1.5	1.5
	Incorp.	80	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
LOUISIANA ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	26	3.8	3.8	3.8	4.3	4.3	4.3
	Surface	37	5.1	5.1	5.1	5.6	5.6	5.6
	Incorp.	26	3.1	3.0	3.0	3.1	3.0	3.0
	Incorp.	37	4.4	4.3	4.3	4.4	4.3	4.3
Anaerobic	Surface	26	3.5	3.5	3.5	4.1	4.1	4.1
	Surface	37	4.7	4.7	4.7	5.2	5.2	5.2
	Incorp.	26	2.8	2.4	2.4	2.8	2.4	2.4
	Incorp.	37	4.0	3.5	3.4	4.0	3.5	3.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
LOUISIANA ----- WHEAT

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	42	2.0	2.0	2.0	2.4	2.4	2.4
	Surface	60	2.6	2.6	2.6	3.0	3.0	3.0
	Incorp.	42	1.4	1.4	1.4	1.5	1.4	1.4
	Incorp.	60	2.1	2.0	2.0	2.1	2.0	2.0
Anaerobic	Surface	42	1.9	1.9	1.9	2.3	2.3	2.3
	Surface	60	2.4	2.4	2.4	2.8	2.8	2.8
	Incorp.	42	1.3	1.2	1.1	1.3	1.2	1.1
	Incorp.	60	1.9	1.6	1.6	1.9	1.6	1.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

MARYLAND

Crops Included:

Apples
Barley
Corn
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rye
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *

MARYLAND ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.1	3.1	3.1	3.3	3.3	3.3
	Surface	130	4.0	4.0	4.0	4.2	4.2	4.2
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.9	2.9	2.9	3.0	3.0	3.0
	Surface	130	3.6	3.6	3.6	3.8	3.8	3.8
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

MARYLAND ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	60	3.4	3.4	3.4	3.6	3.6	3.6
	Surface	86	4.7	4.7	4.7	5.0	5.0	5.0
	Incorp.	60	3.1	3.1	3.0	3.1	3.1	3.0
	Incorp.	86	4.4	4.4	4.3	4.4	4.4	4.3
Anaerobic	Surface	60	3.1	3.1	3.1	3.4	3.4	3.4
	Surface	86	4.3	4.3	4.3	4.6	4.6	4.6
	Incorp.	60	2.8	2.5	2.4	2.8	2.5	2.4
	Incorp.	86	4.0	3.5	3.4	4.0	3.5	3.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MARYLAND ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	103	4.3	4.3	4.3	4.6	4.6	4.6
	Surface	147	5.9	5.9	5.9	6.3	6.3	6.3
	Incorp.	103	3.8	3.8	3.8	3.8	3.8	3.8
	Incorp.	147	5.5	5.4	5.4	5.5	5.4	5.4
Anaerobic	Surface	103	3.9	3.9	3.9	4.3	4.3	4.3
	Surface	147	5.4	5.4	5.4	5.8	5.8	5.8
	Incorp.	103	3.5	3.1	3.0	3.5	3.1	3.0
	Incorp.	147	5.0	4.4	4.3	5.0	4.4	4.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MARYLAND ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.6	0.6	0.6	0.8	0.8	0.8
	Surface	4	0.7	0.7	0.7	0.9	0.9	0.9
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	3	0.6	0.6	0.6	0.8	0.8	0.8
	Surface	4	0.7	0.7	0.7	0.9	0.9	0.9
	Incorp.	3	0.3	0.2	0.2	0.3	0.2	0.2
	Incorp.	4	0.4	0.3	0.3	0.4	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MARYLAND ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.7	3.7	3.7	3.9	3.9	3.9
¦	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.4	3.4	3.4	3.6	3.6	3.6
¦	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MARYLAND ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	58	1.8	1.8	1.8	2.0	2.0	2.0
¦	Surface	83	2.5	2.5	2.5	2.7	2.7	2.7
¦	Incorp.	58	1.5	1.5	1.5	1.5	1.5	1.5
¦	Incorp.	83	2.1	2.1	2.1	2.1	2.1	2.1
Anaerobic	Surface	58	1.7	1.7	1.7	1.9	1.9	1.9
¦	Surface	83	2.3	2.3	2.3	2.5	2.5	2.5
¦	Incorp.	58	1.4	1.2	1.2	1.4	1.2	1.2
¦	Incorp.	83	1.9	1.7	1.7	1.9	1.7	1.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MARYLAND ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	100	2.3	2.3	2.3	2.5	2.5	2.5
	Surface	130	3.0	3.0	3.0	3.1	3.1	3.1
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.1	2.1	2.1	2.3	2.3	2.3
	Surface	130	2.7	2.7	2.7	2.9	2.9	2.9
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MARYLAND ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	30	1.2	1.2	1.2	1.4	1.4	1.4
	Surface	43	1.6	1.6	1.6	1.8	1.8	1.8
	Incorp.	30	0.9	0.9	0.9	0.9	0.9	0.9
	Incorp.	43	1.4	1.3	1.3	1.4	1.3	1.3
Anaerobic	Surface	30	1.1	1.1	1.1	1.3	1.3	1.3
	Surface	43	1.5	1.5	1.5	1.6	1.6	1.6
	Incorp.	30	0.9	0.8	0.7	0.9	0.8	0.7
	Incorp.	43	1.2	1.1	1.1	1.2	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

MARYLAND ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	30	3.9	3.9	3.9	4.3	4.3	4.3
	Surface	43	5.5	5.5	5.5	5.8	5.8	5.8
	Incorp.	30	3.5	3.5	3.5	3.5	3.5	3.5
	Incorp.	43	5.0	5.0	4.9	5.0	5.0	5.0
Anaerobic	Surface	30	3.6	3.6	3.6	3.9	3.9	3.9
	Surface	43	5.0	5.0	5.0	5.3	5.3	5.3
	Incorp.	30	3.2	2.8	2.7	3.2	2.8	2.8
	Incorp.	43	4.6	4.0	3.9	4.6	4.0	3.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MARYLAND ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	42	1.8	1.8	1.8	2.0	2.0	2.0
	Surface	60	2.4	2.4	2.4	2.6	2.6	2.6
	Incorp.	42	1.4	1.4	1.4	1.4	1.4	1.4
	Incorp.	60	2.1	2.0	2.0	2.1	2.0	2.0
Anaerobic	Surface	42	1.6	1.6	1.6	1.9	1.9	1.9
	Surface	60	2.2	2.2	2.2	2.4	2.4	2.4
	Incorp.	42	1.3	1.2	1.1	1.3	1.2	1.1
	Incorp.	60	1.9	1.6	1.6	1.9	1.6	1.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

MASSACHUSETTS

Crops Included:

Apples
Forages
Horticulture
Peach, Nectarine, Cherry, Plum

Annual Sludge Application Rate, dry tons/acre *
MASSACHUSSETTS----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.1	3.1	3.1	3.2	3.2	3.2
:	Surface	130	3.9	3.9	3.9	4.1	4.1	4.1
:	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
:	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.8	2.8	2.8	2.9	2.9	2.9
:	Surface	130	3.6	3.6	3.6	3.7	3.7	3.7
:	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
:	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MASSACHUSETTS ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.5	0.5	0.5	0.7	0.7	0.7
:	Surface	4	0.6	0.6	0.6	0.8	0.8	0.8
:	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
:	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	3	0.5	0.5	0.5	0.6	0.6	0.6
:	Surface	4	0.6	0.6	0.6	0.8	0.8	0.8
:	Incorp.	3	0.3	0.2	0.2	0.3	0.2	0.2
:	Incorp.	4	0.4	0.3	0.3	0.4	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MASSACHUSETTS ----- HORTICULTURE

		Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.6	3.6	3.6	3.8	3.8	3.8
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.3	3.3	3.3	3.5	3.5	3.5
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MASSACHUSETTS ----- PEACH,NECTARINE,CHERRY,PLUM

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.3	2.3	2.3	2.5	2.5	2.5
	Surface	130	3.0	3.0	3.0	3.1	3.1	3.1
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.1	2.1	2.1	2.3	2.3	2.3
	Surface	130	2.7	2.7	2.7	2.9	2.9	2.9
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

MICHIGAN (South)

Crops Included:

Apples
Barley
Corn
Forages
Grapes, Vineyards
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Soybeans
Wheat

MICHIGAN(S) ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.0	3.0	3.0	3.1	3.1	3.1
	Surface	130	3.9	3.9	3.9	4.0	4.0	4.0
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.8	2.8	2.8	2.9	2.9	2.9
	Surface	130	3.5	3.5	3.5	3.7	3.7	3.7
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *

MICHIGAN(S) ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	59	3.2	3.2	3.2	3.4	3.4	3.4
	Surface	84	4.5	4.5	4.5	4.7	4.7	4.7
	Incorp.	59	3.0	3.0	3.0	3.0	3.0	3.0
	Incorp.	84	4.4	4.3	4.3	4.4	4.3	4.3
Anaerobic	Surface	59	3.0	3.0	3.0	3.1	3.1	3.1
	Surface	84	4.2	4.2	4.2	4.3	4.3	4.3
	Incorp.	59	2.8	2.4	2.4	2.8	2.4	2.4
	Incorp.	84	4.0	3.5	3.4	4.0	3.5	3.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MICHIGAN(S) ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	107	4.3	4.3	4.3	4.5	4.5	4.5
	Surface	153	6.0	6.0	6.0	6.2	6.2	6.2
	Incorp.	107	4.0	3.9	3.9	4.0	3.9	3.9
	Incorp.	153	5.7	5.6	5.6	5.7	5.6	5.6
Anaerobic	Surface	107	3.9	3.9	3.9	4.1	4.1	4.1
	Surface	153	5.5	5.5	5.5	5.7	5.7	5.7
	Incorp.	107	3.6	3.2	3.1	3.6	3.2	3.1
	Incorp.	153	5.2	4.5	4.4	5.2	4.5	4.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MICHIGAN(S) ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.6	0.6	0.6	0.7	0.7	0.7
	Surface	5	0.7	0.7	0.7	0.8	0.8	0.8
	Incorp.	3	0.4	0.4	0.4	0.4	0.4	0.4
	Incorp.	5	0.5	0.5	0.5	0.5	0.5	0.5
Anaerobic	Surface	3	0.5	0.5	0.5	0.7	0.7	0.7
	Surface	5	0.7	0.7	0.7	0.8	0.8	0.8
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	5	0.5	0.4	0.4	0.5	0.4	0.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MICHIGAN(S) ----- GRAPES, VINEYARDS

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	1.7	1.7	1.7	1.8	1.8	1.8
¦	Incorp.	1.5	1.5	1.5	1.6	1.5	1.5
Anaerobic	Surface	1.6	1.6	1.6	1.7	1.7	1.7
¦	Incorp.	1.4	1.2	1.2	1.4	1.2	1.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MICHIGAN(S) ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	3.6	3.6	3.6	3.7	3.7	3.7
¦	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.3	3.3	3.3	3.4	3.4	3.4
¦	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MICHIGAN(S) ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	63	1.8	1.8	1.8	2.0	2.0	2.0
	Surface	90	2.5	2.5	2.5	2.7	2.7	2.7
	Incorp.	63	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	90	2.3	2.3	2.3	2.3	2.3	2.3
Anaerobic	Surface	63	1.7	1.7	1.7	1.8	1.8	1.8
	Surface	90	2.3	2.3	2.3	2.5	2.5	2.5
	Incorp.	63	1.5	1.3	1.3	1.5	1.3	1.3
	Incorp.	90	2.1	1.8	1.8	2.1	1.8	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MICHIGAN(S) ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.3	2.3	2.3	2.4	2.4	2.4
	Surface	130	3.0	3.0	3.0	3.1	3.1	3.1
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.1	2.1	2.1	2.2	2.2	2.2
	Surface	130	2.7	2.7	2.7	2.8	2.8	2.8
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MICHIGAN(S) ----- RYE

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	30	1.1	1.1	1.1	1.3	1.3	1.3
	Surface	43	1.6	1.6	1.6	1.7	1.7	1.7
	Incorp.	30	0.9	0.9	0.9	0.9	0.9	0.9
	Incorp.	43	1.4	1.3	1.3	1.4	1.3	1.3
Anaerobic	Surface	30	1.1	1.1	1.1	1.2	1.2	1.2
	Surface	43	1.4	1.4	1.4	1.6	1.6	1.6
	Incorp.	30	0.9	0.8	0.7	0.9	0.8	0.7
	Incorp.	43	1.2	1.1	1.1	1.2	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MICHIGAN(S) ----- SOYBEANS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	32	4.0	4.0	4.0	4.2	4.2	4.2
	Surface	46	5.6	5.6	5.6	5.8	5.8	5.8
	Incorp.	32	3.8	3.7	3.7	3.8	3.7	3.7
	Incorp.	46	5.4	5.3	5.3	5.4	5.3	5.3
Anaerobic	Surface	32	3.7	3.7	3.7	3.9	3.9	3.9
	Surface	46	5.2	5.2	5.2	5.3	5.3	5.3
	Incorp.	32	3.4	3.0	2.9	3.4	3.0	2.9
	Incorp.	46	4.9	4.3	4.2	4.9	4.3	4.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MICHIGAN(S) ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	51	2.0	2.0	2.0	2.1	2.1	2.1
	Surface	73	2.7	2.7	2.7	2.9	2.9	2.9
	Incorp.	51	1.8	1.7	1.7	1.8	1.7	1.7
	Incorp.	73	2.5	2.5	2.5	2.5	2.5	2.5
Anaerobic	Surface	51	1.8	1.8	1.8	1.9	1.9	1.9
	Surface	73	2.5	2.5	2.5	2.6	2.6	2.6
	Incorp.	51	1.6	1.4	1.4	1.6	1.4	1.4
	Incorp.	73	2.3	2.0	2.0	2.3	2.0	2.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

MINNESOTA

Crops Included:

Apples
Barley
Corn
Forages
Horticulture
Oats
Rye
Soybeans
Sun Flower
Wheat

Annual Sludge Application Rate, dry tons/acre *
MINNESOTA ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.0	3.0	3.0	3.1	3.1	3.1
:	Surface	130	3.9	3.9	3.9	4.0	4.0	4.0
:	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
:	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.8	2.8	2.8	2.9	2.9	2.9
:	Surface	130	3.5	3.5	3.5	3.7	3.7	3.7
:	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
:	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MINNESOTA ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	58	3.2	3.2	3.2	3.3	3.3	3.3
:	Surface	83	4.5	4.5	4.5	4.6	4.6	4.6
:	Incorp.	58	3.0	2.9	2.9	3.0	2.9	2.9
:	Incorp.	83	4.3	4.2	4.2	4.3	4.2	4.2
Anaerobic	Surface	58	2.9	2.9	2.9	3.1	3.1	3.1
:	Surface	83	4.1	4.1	4.1	4.2	4.2	4.2
:	Incorp.	58	2.7	2.4	2.3	2.7	2.4	2.3
:	Incorp.	83	3.9	3.4	3.3	3.9	3.4	3.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MINNESOTA ----- CORN

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	113	4.5	4.5	4.5	4.7	4.7	4.7
	Surface	161	6.3	6.3	6.3	6.5	6.5	6.5
	Incorp.	113	4.2	4.1	4.1	4.2	4.1	4.1
	Incorp.	161	6.0	5.9	5.9	6.0	5.9	5.9
Anaerobic	Surface	113	4.1	4.1	4.1	4.3	4.3	4.3
	Surface	161	5.8	5.8	5.8	6.0	6.0	6.0
	Incorp.	113	3.8	3.3	3.3	3.8	3.3	3.3
	Incorp.	161	5.5	4.8	4.7	5.5	4.8	4.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MINNESOTA ----- FORAGES

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield t/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.5	0.5	0.5	0.7	0.7	0.7
	Surface	4	0.7	0.7	0.7	0.8	0.8	0.8
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.5	0.5	0.5	0.5	0.5	0.5
Anaerobic	Surface	3	0.5	0.5	0.5	0.6	0.6	0.6
	Surface	4	0.6	0.6	0.6	0.8	0.8	0.8
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MINNESOTA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.6	3.6	3.6	3.7	3.7	3.7
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.3	3.3	3.3	3.4	3.4	3.4
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MINNESOTA ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	64	1.9	1.9	1.9	2.0	2.0	2.0
	Surface	91	2.6	2.6	2.6	2.7	2.7	2.7
	Incorp.	64	1.7	1.6	1.6	1.7	1.6	1.6
	Incorp.	91	2.4	2.3	2.3	2.4	2.3	2.3
Anaerobic	Surface	64	1.7	1.7	1.7	1.8	1.8	1.8
	Surface	91	2.3	2.3	2.3	2.5	2.5	2.5
	Incorp.	64	1.5	1.3	1.3	1.5	1.3	1.3
	Incorp.	91	2.1	1.9	1.8	2.1	1.9	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MINNESOTA ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	33	1.2	1.2	1.2	1.4	1.4	1.4
	Surface	47	1.7	1.7	1.7	1.8	1.8	1.8
	Incorp.	33	1.0	1.0	1.0	1.0	1.0	1.0
	Incorp.	47	1.5	1.5	1.5	1.5	1.5	1.5
Anaerobic	Surface	33	1.1	1.1	1.1	1.3	1.3	1.3
	Surface	47	1.6	1.6	1.6	1.7	1.7	1.7
	Incorp.	33	0.9	0.8	0.8	0.9	0.8	0.8
	Incorp.	47	1.4	1.2	1.2	1.4	1.2	1.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MINNESOTA ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	35	4.4	4.4	4.4	4.6	4.6	4.6
	Surface	50	6.1	6.1	6.1	6.3	6.3	6.3
	Incorp.	35	4.1	4.1	4.0	4.1	4.1	4.0
	Incorp.	50	5.9	5.8	5.8	5.9	5.8	5.8
Anaerobic	Surface	35	4.0	4.0	4.0	4.2	4.2	4.2
	Surface	50	5.6	5.6	5.6	5.8	5.8	5.8
	Incorp.	35	3.7	3.3	3.2	3.7	3.3	3.2
	Incorp.	50	5.3	4.7	4.6	5.3	4.7	4.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MINNESOTA ----- SUNFLOWER

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	1329	2.0	2.0	2.0	2.2	2.2	2.2
	Surface	1899	2.7	2.7	2.7	2.9	2.9	2.9
	Incorp.	1329	1.7	1.7	1.7	1.7	1.7	1.7
	Incorp.	1899	2.5	2.4	2.4	2.5	2.4	2.4
Anaerobic	Surface	1329	1.8	1.8	1.8	2.0	2.0	2.0
	Surface	1899	2.5	2.5	2.5	2.7	2.7	2.7
	Incorp.	1329	1.6	1.4	1.3	1.6	1.4	1.3
	Incorp.	1899	2.2	1.9	1.9	2.2	1.9	1.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MINNESOTA ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	40	1.6	1.6	1.6	1.7	1.7	1.7
	Surface	57	2.2	2.2	2.2	2.3	2.3	2.3
	Incorp.	40	1.4	1.4	1.4	1.4	1.4	1.4
	Incorp.	57	2.0	1.9	1.9	2.0	1.9	1.9
Anaerobic	Surface	40	1.5	1.5	1.5	1.6	1.6	1.6
	Surface	57	2.0	2.0	2.0	2.1	2.1	2.1
	Incorp.	40	1.3	1.1	1.1	1.3	1.1	1.1
	Incorp.	57	1.8	1.6	1.5	1.8	1.6	1.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

MISSISSIPPI

Crops Included:

Corn
Cotton
Forages
Horticulture
Peach, Nectarine, Cherry, Plum
Rice
Sorghum
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
MISSISSIPPI ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	64	3.2	3.2	3.2	3.7	3.7	3.7
	Surface	91	4.2	4.2	4.2	4.8	4.8	4.8
	Incorp.	64	2.4	2.4	2.4	2.4	2.4	2.4
	Incorp.	91	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	64	3.0	3.0	3.0	3.5	3.5	3.5
	Surface	91	3.9	3.9	3.9	4.5	4.5	4.5
	Incorp.	64	2.2	1.9	1.9	2.2	1.9	1.9
	Incorp.	91	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSISSIPPI ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	853	2.9	2.9	2.9	3.5	3.5	3.5
	Surface	1219	3.8	3.8	3.8	4.4	4.4	4.4
	Incorp.	853	2.1	2.1	2.1	2.2	2.1	2.1
	Incorp.	1219	3.1	3.0	3.0	3.1	3.0	3.0
Anaerobic	Surface	853	2.7	2.7	2.7	3.3	3.3	3.3
	Surface	1219	3.6	3.6	3.6	4.1	4.1	4.1
	Incorp.	853	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	1219	2.8	2.4	2.4	2.8	2.4	2.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSISSIPPI ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.8	0.8	0.8	1.1	1.1	1.1
	Surface	3	0.9	0.9	0.9	1.2	1.2	1.2
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.3
	Incorp.	3	0.3	0.3	0.3	0.4	0.3	0.4
Anaerobic	Surface	2	0.7	0.7	0.7	1.1	1.1	1.1
	Surface	3	0.8	0.8	0.8	1.2	1.2	1.2
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSISSIPPI ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.9	3.9	3.9	4.2	4.2	4.2
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.6	3.6	3.6	3.9	3.9	3.9
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSISSIPPI ----- PEACH,NECTARINE,CHERRY,PLUM

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.6	2.6	2.6	2.9	2.9	2.9
	Surface	130	3.2	3.2	3.2	3.6	3.6	3.6
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.8
Anaerobic	Surface	100	2.4	2.4	2.4	2.7	2.7	2.7
	Surface	130	3.0	3.0	3.0	3.3	3.3	3.3
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSISSIPPI ----- RICE

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield lb/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	4390	2.8	2.8	2.8	3.2	3.2	3.2
	Surface	6271	3.7	3.7	3.7	4.1	4.1	4.1
	Incorp.	4390	2.2	2.2	2.2	2.2	2.2	2.2
	Incorp.	6271	3.2	3.1	3.1	3.2	3.1	3.1
Anaerobic	Surface	4390	2.6	2.6	2.6	3.0	3.0	3.0
	Surface	6271	3.4	3.4	3.4	3.8	3.8	3.8
	Incorp.	4390	2.0	1.8	1.7	2.0	1.8	1.7
	Incorp.	6271	2.9	2.5	2.5	2.9	2.5	2.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSISSIPPI ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	56	2.7	2.7	2.7	3.3	3.3	3.3
	Surface	80	3.5	3.5	3.5	4.1	4.1	4.1
	Incorp.	56	1.9	1.9	1.9	1.9	1.9	1.9
	Incorp.	80	2.8	2.7	2.7	2.8	2.7	2.7
Anaerobic	Surface	56	2.5	2.5	2.5	3.1	3.1	3.1
	Surface	80	3.3	3.3	3.3	3.9	3.9	3.9
	Incorp.	56	1.8	1.5	1.5	1.8	1.5	1.5
	Incorp.	80	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSISSIPPI ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	26	3.8	3.8	3.8	4.3	4.3	4.3
	Surface	37	5.1	5.1	5.1	5.6	5.6	5.6
	Incorp.	26	3.1	3.0	3.0	3.1	3.0	3.0
	Incorp.	37	4.4	4.3	4.3	4.4	4.3	4.3
Anaerobic	Surface	26	3.5	3.5	3.5	4.1	4.1	4.1
	Surface	37	4.7	4.7	4.7	5.2	5.2	5.2
	Incorp.	26	2.8	2.4	2.4	2.8	2.4	2.4
	Incorp.	37	4.0	3.5	3.4	4.0	3.5	3.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSISSIPPI ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	40	1.9	1.9	1.9	2.3	2.3	2.3
	Surface	57	2.5	2.5	2.5	2.9	2.9	2.9
	Incorp.	40	1.4	1.4	1.4	1.4	1.4	1.4
	Incorp.	57	2.0	1.9	1.9	2.0	1.9	1.9
Anaerobic	Surface	40	1.8	1.8	1.8	2.2	2.2	2.2
	Surface	57	2.3	2.3	2.3	2.8	2.8	2.8
	Incorp.	40	1.3	1.1	1.1	1.3	1.1	1.1
	Incorp.	57	1.8	1.6	1.5	1.8	1.6	1.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

MISSOURI

Crops Included:

Apples
Corn
Cotton
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rice
Rye
Sorghum
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
MISSOURI ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.2	3.2	3.2	3.4	3.4	3.4
	Surface	130	4.0	4.0	4.0	4.2	4.2	4.2
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.9	2.9	2.9	3.1	3.1	3.1
	Surface	130	3.7	3.7	3.7	3.9	3.9	3.9
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSOURI ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	107	4.5	4.5	4.5	4.9	4.9	4.9
	Surface	153	6.2	6.2	6.2	6.6	6.6	6.6
	Incorp.	107	4.0	3.9	3.9	4.0	3.9	3.9
	Incorp.	153	5.7	5.6	5.6	5.7	5.6	5.6
Anaerobic	Surface	107	4.1	4.1	4.1	4.5	4.5	4.5
	Surface	153	5.7	5.7	5.7	6.1	6.1	6.1
	Incorp.	107	3.6	3.2	3.1	3.6	3.2	3.1
	Incorp.	153	5.2	4.5	4.4	5.2	4.5	4.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSOURI ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	648	2.1	2.1	2.1	2.5	2.5	2.5
	Surface	926	2.8	2.8	2.8	3.2	3.2	3.2
	Incorp.	648	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	926	2.3	2.3	2.3	2.3	2.3	2.3
Anaerobic	Surface	648	2.0	2.0	2.0	2.4	2.4	2.4
	Surface	926	2.6	2.6	2.6	3.0	3.0	3.0
	Incorp.	648	1.5	1.3	1.3	1.5	1.3	1.3
	Incorp.	926	2.1	1.8	1.8	2.1	1.9	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSOURI ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	2	0.6	0.6	0.6	0.8	0.8	0.8
	Surface	3	0.6	0.6	0.6	0.9	0.9	0.9
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
Anaerobic	Surface	2	0.5	0.5	0.5	0.8	0.8	0.8
	Surface	3	0.6	0.6	0.6	0.9	0.9	0.9
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.2	0.3	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSOURI ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.7	3.7	3.7	3.9	3.9	3.9
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.4	3.4	3.4	3.6	3.6	3.6
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSOURI ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	52	1.7	1.7	1.7	2.0	2.0	2.0
	Surface	74	2.3	2.3	2.3	2.5	2.5	2.5
	Incorp.	52	1.3	1.3	1.3	1.3	1.3	1.3
	Incorp.	74	1.9	1.9	1.9	1.9	1.9	1.9
Anaerobic	Surface	52	1.6	1.6	1.6	1.8	1.8	1.8
	Surface	74	2.1	2.1	2.1	2.4	2.4	2.4
	Incorp.	52	1.2	1.1	1.0	1.2	1.1	1.1
	Incorp.	74	1.7	1.5	1.5	1.7	1.5	1.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSOURI ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.4	2.4	2.4	2.6	2.6	2.6
	Surface	130	3.1	3.1	3.1	3.3	3.3	3.3
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.8
Anaerobic	Surface	100	2.2	2.2	2.2	2.4	2.4	2.4
	Surface	130	2.8	2.8	2.8	3.0	3.0	3.0
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSOURI ----- RICE

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	4480	2.6	2.6	2.6	2.9	2.9	2.9
	Surface	6400	3.6	3.6	3.6	3.8	3.8	3.8
	Incorp.	4480	2.3	2.2	2.2	2.3	2.2	2.2
	Incorp.	6400	3.2	3.2	3.2	3.2	3.2	3.2
Anaerobic	Surface	4480	2.4	2.4	2.4	2.7	2.7	2.7
	Surface	6400	3.3	3.3	3.3	3.5	3.5	3.5
	Incorp.	4480	2.0	1.8	1.8	2.0	1.8	1.8
	Incorp.	6400	2.9	2.6	2.5	2.9	2.6	2.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSOURI ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	25	1.1	1.1	1.1	1.4	1.4	1.4
	Surface	36	1.5	1.5	1.5	1.7	1.7	1.7
	Incorp.	25	0.8	0.8	0.8	0.8	0.8	0.8
	Incorp.	36	1.1	1.1	1.1	1.1	1.1	1.1
Anaerobic	Surface	25	1.1	1.1	1.1	1.3	1.3	1.3
	Surface	36	1.4	1.4	1.4	1.6	1.6	1.6
	Incorp.	25	0.7	0.6	0.6	0.7	0.6	0.6
	Incorp.	36	1.0	0.9	0.9	1.0	0.9	0.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSOURI ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	78	3.2	3.2	3.2	3.6	3.6	3.6
	Surface	111	4.3	4.3	4.3	4.7	4.7	4.7
	Incorp.	78	2.7	2.6	2.6	2.7	2.7	2.6
	Incorp.	111	3.8	3.8	3.8	3.8	3.8	3.8
Anaerobic	Surface	78	2.9	2.9	2.9	3.3	3.3	3.3
	Surface	111	4.0	4.0	4.0	4.4	4.4	4.4
	Incorp.	78	2.4	2.1	2.1	2.4	2.1	2.1
	Incorp.	111	3.5	3.0	3.0	3.5	3.1	3.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSOURI ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	30	4.0	4.0	4.0	4.3	4.3	4.3
	Surface	43	5.5	5.5	5.5	5.9	5.9	5.9
	Incorp.	30	3.5	3.5	3.5	3.5	3.5	3.5
	Incorp.	43	5.0	5.0	5.0	5.0	5.0	5.0
Anaerobic	Surface	30	3.7	3.7	3.7	4.0	4.0	4.0
	Surface	43	5.1	5.1	5.1	5.4	5.4	5.4
	Incorp.	30	3.2	2.8	2.7	3.2	2.8	2.8
	Incorp.	43	4.6	4.0	3.9	4.6	4.0	3.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MISSOURI ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	42	1.8	1.8	1.8	2.1	2.1	2.1
	Surface	60	2.4	2.4	2.4	2.7	2.7	2.7
	Incorp.	42	1.4	1.4	1.4	1.4	1.4	1.4
	Incorp.	60	2.1	2.0	2.0	2.1	2.0	2.0
Anaerobic	Surface	42	1.7	1.7	1.7	1.9	1.9	1.9
	Surface	60	2.2	2.2	2.2	2.5	2.5	2.5
	Incorp.	42	1.3	1.2	1.1	1.3	1.2	1.1
	Incorp.	60	1.9	1.6	1.6	1.9	1.6	1.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

MONTANA

Crops Included:

Barley
Corn
Forages
Horticulture
Oats
Tree Farming
Wheat

Annual Sludge Application Rate, dry tons/acre *
MONTANA ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %			
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil	ne il
Aerobic	Surface	49	2.6	2.6	2.6	2.6	2.6	2.6	6
	Surface	70	3.7	3.7	3.7	3.7	3.7	3.7	7
	Incorp.	49	2.5	2.5	2.5	2.5	2.5	2.5	5
	Incorp.	70	3.6	3.6	3.5	3.6	3.6	3.5	5
Anaerobic	Surface	49	2.4	2.4	2.4	2.4	2.4	2.4	4
	Surface	70	3.3	3.3	3.3	3.4	3.4	3.4	4
	Incorp.	49	2.3	2.0	2.0	2.3	2.0	2.0	0
	Incorp.	70	3.3	2.9	2.8	3.3	2.9	2.8	3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MONTANA ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	105	4.0	4.0	4.0	4.0	4.0	4.0
	Surface	150	5.7	5.7	5.7	5.7	5.7	5.7
	Incorp.	105	3.9	3.9	3.8	3.9	3.9	3.8
	Incorp.	150	5.6	5.5	5.5	5.6	5.5	5.5
Anaerobic	Surface	105	3.6	3.6	3.6	3.7	3.7	3.7
	Surface	150	5.2	5.2	5.2	5.2	5.2	5.2
	Incorp.	105	3.6	3.1	3.0	3.6	3.1	3.0
	Incorp.	150	5.1	4.4	4.3	5.1	4.4	4.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MONTANA ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	2	0.3	0.3	0.3	0.3	0.3	0.3
	Surface	3	0.4	0.4	0.4	0.4	0.4	0.4
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
Anaerobic	Surface	2	0.3	0.3	0.3	0.3	0.3	0.3
	Surface	3	0.4	0.4	0.4	0.4	0.4	0.4
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MONTANA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	3.5	3.5	3.5	3.5	3.5	3.5
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.2	3.2	3.2	3.2	3.2	3.2
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
MONTANA ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	51	1.4	1.4	1.4	1.4	1.4	1.4
	Surface	73	1.9	1.9	1.9	2.0	2.0	2.0
	Incorp.	51	1.3	1.3	1.3	1.3	1.3	1.3
	Incorp.	73	1.9	1.9	1.8	1.9	1.9	1.8
Anaerobic	Surface	51	1.3	1.3	1.3	1.3	1.3	1.3
	Surface	73	1.8	1.8	1.8	1.8	1.8	1.8
	Incorp.	51	1.2	1.0	1.0	1.2	1.0	1.0
	Incorp.	73	1.7	1.5	1.5	1.7	1.5	1.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre
MONTANA ----- TREE FARMING *

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	5.8	5.8	5.8	5.8	5.8	5.8
	Incorp.	5.7	5.6	5.6	5.7	5.6	5.6
Anaerobic	Surface	5.3	5.3	5.3	5.3	5.3	5.3
	Incorp.	5.2	4.6	4.5	5.2	4.6	4.5

* Includes white pines, Douglas-fir, southern pine, spruce, aspen, oak, and hickory.

Annual Sludge Application Rate, dry tons/acre *
MONTANA ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	34	1.2	1.2	1.2	1.3	1.3	1.3
	Surface	49	1.7	1.7	1.7	1.8	1.8	1.8
	Incorp.	34	1.2	1.2	1.1	1.2	1.2	1.1
	Incorp.	49	1.7	1.6	1.6	1.7	1.6	1.6
Anaerobic	Surface	34	1.1	1.1	1.1	1.2	1.2	1.2
	Surface	49	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	34	1.1	0.9	0.9	1.1	0.9	0.9
	Incorp.	49	1.5	1.3	1.3	1.5	1.3	1.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

NEBRASKA

Crops Included:

- Barley
- Corn
- Forages
- Horticulture
- Oats
- Rye
- Sorghum
- Soybeans
- Wheat

Annual Sludge Application Rate, dry tons/acre *
NEBRASKA ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	50	2.7	2.7	2.7	2.9	2.9	2.9
	Surface	71	3.8	3.8	3.8	4.0	4.0	4.0
	Incorp.	50	2.6	2.5	2.5	2.6	2.5	2.5
	Incorp.	71	3.7	3.6	3.6	3.7	3.6	3.6
Anaerobic	Surface	50	2.5	2.5	2.5	2.6	2.6	2.6
	Surface	71	3.5	3.5	3.5	3.6	3.6	3.6
	Incorp.	50	2.3	2.0	2.0	2.3	2.1	2.0
	Incorp.	71	3.4	2.9	2.9	3.4	2.9	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEBRASKA ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	115	4.5	4.5	4.5	4.7	4.7	4.7
	Surface	164	6.3	6.3	6.3	6.5	6.5	6.5
	Incorp.	115	4.3	4.2	4.2	4.3	4.2	4.2
	Incorp.	164	6.1	6.0	6.0	6.1	6.0	6.0
Anaerobic	Surface	115	4.1	4.1	4.1	4.3	4.3	4.3
	Surface	164	5.8	5.8	5.8	6.0	6.0	6.0
	Incorp.	115	3.9	3.4	3.3	3.9	3.4	3.3
	Incorp.	164	5.6	4.9	4.8	5.6	4.9	4.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEBRASKA ----- FORAGES

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield t/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.4	0.4	0.4	0.5	0.5	0.5
	Surface	3	0.5	0.5	0.5	0.6	0.6	0.6
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
Anaerobic	Surface	2	0.4	0.4	0.4	0.5	0.5	0.5
	Surface	3	0.5	0.5	0.5	0.6	0.6	0.6
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEBRASKA ----- HORTICULTURE

		Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.6	3.6	3.6	3.7	3.7	3.7
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.3	3.3	3.3	3.3	3.3	3.3
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *

NEBRASKA ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	58	1.7	1.7	1.7	1.8	1.8	1.8
	Surface	83	2.3	2.3	2.3	2.4	2.4	2.4
	Incorp.	58	1.5	1.5	1.5	1.5	1.5	1.5
	Incorp.	83	2.1	2.1	2.1	2.1	2.1	2.1
Anaerobic	Surface	58	1.5	1.5	1.5	1.6	1.6	1.6
	Surface	83	2.1	2.1	2.1	2.2	2.2	2.2
	Incorp.	58	1.4	1.2	1.2	1.4	1.2	1.2
	Incorp.	83	1.9	1.7	1.7	1.9	1.7	1.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *

NEBRASKA ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	27	1.0	1.0	1.0	1.1	1.1	1.1
	Surface	39	1.4	1.4	1.4	1.5	1.5	1.5
	Incorp.	27	0.9	0.8	0.8	0.9	0.8	0.8
	Incorp.	39	1.2	1.2	1.2	1.2	1.2	1.2
Anaerobic	Surface	27	0.9	0.9	0.9	1.1	1.1	1.1
	Surface	39	1.3	1.3	1.3	1.4	1.4	1.4
	Incorp.	27	0.8	0.7	0.7	0.8	0.7	0.7
	Incorp.	39	1.1	1.0	0.9	1.1	1.0	0.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEBRASKA ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	80	3.0	3.0	3.0	3.1	3.1	3.1
	Surface	114	4.2	4.2	4.2	4.3	4.3	4.3
	Incorp.	80	2.8	2.7	2.7	2.8	2.7	2.7
	Incorp.	114	3.9	3.9	3.9	3.9	3.9	3.9
Anaerobic	Surface	80	2.7	2.7	2.7	2.9	2.9	2.9
	Surface	114	3.8	3.8	3.8	4.0	4.0	4.0
	Incorp.	80	2.5	2.2	2.1	2.5	2.2	2.1
	Incorp.	114	3.6	3.1	3.1	3.6	3.1	3.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEBRASKA ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	38	4.7	4.7	4.7	4.8	4.8	4.8
	Surface	54	6.6	6.6	6.6	6.7	6.7	6.7
	Incorp.	38	4.5	4.4	4.4	4.5	4.4	4.4
	Incorp.	54	6.4	6.3	6.3	6.4	6.3	6.3
Anaerobic	Surface	38	4.3	4.3	4.3	4.4	4.4	4.4
	Surface	54	6.0	6.0	6.0	6.2	6.2	6.2
	Incorp.	38	4.1	3.5	3.5	4.1	3.5	3.5
	Incorp.	54	5.8	5.1	5.0	5.8	5.1	5.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEBRASKA ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	43	1.6	1.6	1.6	1.8	1.8	1.8
	Surface	61	2.3	2.3	2.3	2.4	2.4	2.4
	Incorp.	43	1.5	1.5	1.5	1.5	1.5	1.5
	Incorp.	61	2.1	2.1	2.1	2.1	2.1	2.1
Anaerobic	Surface	43	1.5	1.5	1.5	1.6	1.6	1.6
	Surface	61	2.1	2.1	2.1	2.2	2.2	2.2
	Incorp.	43	1.3	1.2	1.2	1.3	1.2	1.2
	Incorp.	61	1.9	1.7	1.6	1.9	1.7	1.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

NORTH CAROLINA

Crops Included:

Barley
Corn
Cotton
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Sorghum
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
N. CAROLINA ----- BARLEY

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	55	3.2	3.2	3.2	3.5	3.5	3.5
	Surface	79	4.5	4.5	4.5	4.7	4.7	4.7
	Incorp.	55	2.8	2.8	2.8	2.8	2.8	2.8
	Incorp.	79	4.1	4.0	4.0	4.1	4.0	4.0
Anaerobic	Surface	55	3.0	3.0	3.0	3.3	3.3	3.3
	Surface	79	4.1	4.1	4.1	4.4	4.4	4.4
	Incorp.	55	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	79	3.7	3.2	3.2	3.7	3.2	3.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. CAROLINA ----- CORN

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	99	4.3	4.3	4.3	4.7	4.7	4.7
	Surface	141	5.8	5.8	5.8	6.2	6.2	6.2
	Incorp.	99	3.7	3.6	3.6	3.7	3.6	3.6
	Incorp.	141	5.3	5.2	5.2	5.3	5.2	5.2
Anaerobic	Surface	99	3.9	3.9	3.9	4.3	4.3	4.3
	Surface	141	5.4	5.4	5.4	5.8	5.8	5.8
	Incorp.	99	3.4	2.9	2.9	3.4	2.9	2.9
	Incorp.	141	4.8	4.2	4.1	4.8	4.2	4.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. CAROLINA ----- COTTON

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield lb/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	699	2.3	2.3	2.3	2.7	2.7	2.7
	Surface	999	3.1	3.1	3.1	3.5	3.5	3.5
	Incorp.	699	1.8	1.7	1.7	1.8	1.7	1.7
	Incorp.	999	2.5	2.5	2.5	2.5	2.5	2.5
Anaerobic	Surface	699	2.2	2.2	2.2	2.6	2.6	2.6
	Surface	999	2.8	2.8	2.8	3.2	3.2	3.2
	Incorp.	699	1.6	1.4	1.4	1.6	1.4	1.4
	Incorp.	999	2.3	2.0	2.0	2.3	2.0	2.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. CAROLINA ----- FORAGES

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield t/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.6	0.6	0.6	0.8	0.8	0.8
	Surface	2	0.6	0.6	0.6	0.9	0.9	0.9
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	2	0.3	0.3	0.3	0.3	0.3	0.3
Anaerobic	Surface	2	0.5	0.5	0.5	0.8	0.8	0.8
	Surface	2	0.6	0.6	0.6	0.9	0.9	0.9
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	2	0.3	0.2	0.2	0.3	0.2	0.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. CAROLINA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	3.8	3.8	3.8	4.0	4.0	4.0
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.4	3.4	3.4	3.7	3.7	3.7
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. CAROLINA ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	59	1.9	1.9	1.9	2.2	2.2	2.2
	Surface	84	2.6	2.6	2.6	2.9	2.9	2.9
	Incorp.	59	1.5	1.5	1.5	1.5	1.5	1.5
	Incorp.	84	2.2	2.1	2.1	2.2	2.1	2.1
Anaerobic	Surface	59	1.8	1.8	1.8	2.1	2.1	2.1
	Surface	84	2.4	2.4	2.4	2.7	2.7	2.7
	Incorp.	59	1.4	1.2	1.2	1.4	1.2	1.2
	Incorp.	84	2.0	1.7	1.7	2.0	1.7	1.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NORTH CAROLINA----- PEACH,NECTARINE,CHERRY,PLUM

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.5	2.5	2.5	2.7	2.7	2.7
	Surface	130	3.1	3.1	3.1	3.3	3.3	3.3
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.8
Anaerobic	Surface	100	2.3	2.3	2.3	2.5	2.5	2.5
	Surface	130	2.9	2.9	2.9	3.1	3.1	3.1
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. CAROLINA ----- RYE

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	21	1.1	1.1	1.1	1.4	1.4	1.4
	Surface	30	1.3	1.3	1.3	1.6	1.6	1.6
	Incorp.	21	0.7	0.7	0.7	0.7	0.7	0.7
	Incorp.	30	0.9	0.9	0.9	1.0	0.9	0.9
Anaerobic	Surface	21	1.0	1.0	1.0	1.3	1.3	1.3
	Surface	30	1.3	1.3	1.3	1.6	1.6	1.6
	Incorp.	21	0.6	0.5	0.5	0.6	0.5	0.5
	Incorp.	30	0.9	0.8	0.7	0.9	0.8	0.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. CAROLINA ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	50	2.3	2.3	2.3	2.7	2.7	2.7
	Surface	71	3.0	3.0	3.0	3.4	3.4	3.4
	Incorp.	50	1.7	1.7	1.7	1.7	1.7	1.7
	Incorp.	71	2.5	2.4	2.4	2.5	2.4	2.4
Anaerobic	Surface	50	2.1	2.1	2.1	2.5	2.5	2.5
	Surface	71	2.8	2.8	2.8	3.2	3.2	3.2
	Incorp.	50	1.6	1.4	1.3	1.6	1.4	1.4
	Incorp.	71	2.2	2.0	1.9	2.2	2.0	1.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. CAROLINA ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	25	3.5	3.5	3.5	3.8	3.8	3.8
	Surface	36	4.7	4.7	4.7	5.1	5.1	5.1
	Incorp.	25	2.9	2.9	2.9	2.9	2.9	2.9
	Incorp.	36	4.2	4.1	4.1	4.2	4.1	4.1
Anaerobic	Surface	25	3.2	3.2	3.2	3.6	3.6	3.6
	Surface	36	4.3	4.3	4.3	4.7	4.7	4.7
	Incorp.	25	2.7	2.3	2.3	2.7	2.3	2.3
	Incorp.	36	3.8	3.3	3.3	3.8	3.3	3.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. CAROLINA ----- WHEAT

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	39	1.7	1.7	1.7	2.0	2.0	2.0
	Surface	56	2.3	2.3	2.3	2.6	2.6	2.6
	Incorp.	39	1.3	1.3	1.3	1.3	1.3	1.3
	Incorp.	56	1.9	1.9	1.9	1.9	1.9	1.9
Anaerobic	Surface	39	1.6	1.6	1.6	1.9	1.9	1.9
	Surface	56	2.1	2.1	2.1	2.4	2.4	2.4
	Incorp.	39	1.2	1.1	1.0	1.2	1.1	1.1
	Incorp.	56	1.7	1.5	1.5	1.7	1.5	1.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

NORTH DAKOTA

Crops Included:

Barley
Corn
Forages
Horticulture
Oats
Rye
Soybeans
Sun Flower
Wheat

Annual Sludge Application Rate, dry tons/acre *
N. DAKOTA ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	53	2.9	2.9	2.9	2.9	2.9	2.9
	Surface	76	4.0	4.0	4.0	4.1	4.1	4.1
	Incorp.	53	2.7	2.7	2.7	2.7	2.7	2.7
	Incorp.	76	3.9	3.8	3.8	3.9	3.8	3.8
Anaerobic	Surface	53	2.6	2.6	2.6	2.7	2.7	2.7
	Surface	76	3.7	3.7	3.7	3.8	3.8	3.8
	Incorp.	53	2.5	2.2	2.1	2.5	2.2	2.1
	Incorp.	76	3.6	3.1	3.0	3.6	3.1	3.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. DAKOTA ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	81	3.2	3.2	3.2	3.3	3.3	3.3
	Surface	116	4.5	4.5	4.5	4.6	4.6	4.6
	Incorp.	81	3.0	3.0	3.0	3.0	3.0	3.0
	Incorp.	116	4.3	4.2	4.2	4.3	4.2	4.2
Anaerobic	Surface	81	2.9	2.9	2.9	3.0	3.0	3.0
	Surface	116	4.1	4.1	4.1	4.2	4.2	4.2
	Incorp.	81	2.7	2.4	2.3	2.7	2.4	2.4
	Incorp.	116	3.9	3.4	3.4	3.9	3.4	3.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. DAKOTA ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.3	0.3	0.3	0.4	0.4	0.4
¦	Surface	3	0.4	0.4	0.4	0.5	0.5	0.5
¦	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
¦	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
Anaerobic	Surface	2	0.3	0.3	0.3	0.4	0.4	0.4
¦	Surface	3	0.4	0.4	0.4	0.5	0.5	0.5
¦	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
¦	Incorp.	3	0.3	0.2	0.2	0.3	0.2	0.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. DAKOTA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.5	3.5	3.5	3.6	3.6	3.6
¦	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.2	3.2	3.2	3.3	3.3	3.3
¦	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. DAKOTA ----- OATS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	53	1.5	1.5	1.5	1.6	1.6	1.6
	Surface	76	2.1	2.1	2.1	2.2	2.2	2.2
	Incorp.	53	1.4	1.3	1.3	1.4	1.3	1.3
	Incorp.	76	2.0	1.9	1.9	2.0	1.9	1.9
Anaerobic	Surface	53	1.4	1.4	1.4	1.5	1.5	1.5
	Surface	76	1.9	1.9	1.9	2.0	2.0	2.0
	Incorp.	53	1.2	1.1	1.1	1.2	1.1	1.1
	Incorp.	76	1.8	1.6	1.5	1.8	1.6	1.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. DAKOTA ----- RYE

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	32	1.1	1.1	1.1	1.2	1.2	1.2
	Surface	46	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	32	1.0	1.0	1.0	1.0	1.0	1.0
	Incorp.	46	1.4	1.4	1.4	1.4	1.4	1.4
Anaerobic	Surface	32	1.0	1.0	1.0	1.1	1.1	1.1
	Surface	46	1.4	1.4	1.4	1.5	1.5	1.5
	Incorp.	32	0.9	0.8	0.8	0.9	0.8	0.8
	Incorp.	46	1.3	1.1	1.1	1.3	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. DAKOTA ----- SOYBEANS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	28	3.4	3.4	3.4	3.6	3.6	3.6
	Surface	40	4.9	4.9	4.9	5.0	5.0	5.0
	Incorp.	28	3.3	3.2	3.2	3.3	3.2	3.2
	Incorp.	40	4.7	4.6	4.6	4.7	4.6	4.6
Anaerobic	Surface	28	3.2	3.2	3.2	3.3	3.3	3.3
	Surface	40	4.4	4.4	4.4	4.5	4.5	4.5
	Incorp.	28	3.0	2.6	2.6	3.0	2.6	2.6
	Incorp.	40	4.3	3.7	3.7	4.3	3.7	3.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. DAKOTA ----- SUNFLOWER

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield lb/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	1106	1.6	1.6	1.6	1.7	1.7	1.7
	Surface	1580	2.2	2.2	2.2	2.3	2.3	2.3
	Incorp.	1106	1.4	1.4	1.4	1.4	1.4	1.4
	Incorp.	1580	2.0	2.0	2.0	2.0	2.0	2.0
Anaerobic	Surface	1106	1.5	1.5	1.5	1.6	1.6	1.6
	Surface	1580	2.0	2.0	2.0	2.1	2.1	2.1
	Incorp.	1106	1.3	1.1	1.1	1.3	1.1	1.1
	Incorp.	1580	1.9	1.6	1.6	1.9	1.6	1.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
N. DAKOTA ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	32	1.2	1.2	1.2	1.3	1.3	1.3
¦	Surface	46	1.7	1.7	1.7	1.8	1.8	1.8
¦	Incorp.	32	1.1	1.1	1.1	1.1	1.1	1.1
¦	Incorp.	46	1.6	1.5	1.5	1.6	1.5	1.5
Anaerobic	Surface	32	1.1	1.1	1.1	1.2	1.2	1.2
¦	Surface	46	1.6	1.6	1.6	1.6	1.6	1.6
¦	Incorp.	32	1.0	0.9	0.9	1.0	0.9	0.9
¦	Incorp.	46	1.4	1.2	1.2	1.4	1.3	1.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

NEW JERSEY

Crops Included:

Apples
Barley
Corn
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rye
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
NEW JERSEY ----- APPLES

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.1	3.1	3.1	3.2	3.2	3.2
	Surface	130	3.9	3.9	3.9	4.1	4.1	4.1
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.8	2.8	2.8	2.9	2.9	2.9
	Surface	130	3.6	3.6	3.6	3.7	3.7	3.7
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW JERSEY ----- BARLEY

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	63	3.5	3.5	3.5	3.7	3.7	3.7
	Surface	90	4.9	4.9	4.9	5.1	5.1	5.1
	Incorp.	63	3.3	3.2	3.2	3.3	3.2	3.2
	Incorp.	90	4.6	4.6	4.6	4.6	4.6	4.6
Anaerobic	Surface	63	3.2	3.2	3.2	3.4	3.4	3.4
	Surface	90	4.5	4.5	4.5	4.6	4.6	4.6
	Incorp.	63	3.0	2.6	2.5	3.0	2.6	2.5
	Incorp.	90	4.2	3.7	3.6	4.2	3.7	3.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW JERSEY ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	4.1	4.1	4.1	4.3	4.3	4.3
	Surface	143	5.7	5.7	5.7	5.9	5.9	5.9
	Incorp.	100	3.7	3.7	3.7	3.7	3.7	3.7
	Incorp.	143	5.3	5.2	5.2	5.3	5.2	5.2
Anaerobic	Surface	100	3.7	3.7	3.7	4.0	4.0	4.0
	Surface	143	5.2	5.2	5.2	5.4	5.4	5.4
	Incorp.	100	3.4	3.0	2.9	3.4	3.0	2.9
	Incorp.	143	4.8	4.2	4.1	4.8	4.2	4.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW JERSEY ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.5	0.5	0.5	0.7	0.7	0.7
	Surface	4	0.7	0.7	0.7	0.8	0.8	0.8
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	3	0.5	0.5	0.5	0.7	0.7	0.7
	Surface	4	0.6	0.6	0.6	0.8	0.8	0.8
	Incorp.	3	0.3	0.2	0.2	0.3	0.2	0.2
	Incorp.	4	0.4	0.3	0.3	0.4	0.4	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW JERSEY ----- HORTICULTURE

		Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.6	3.6	3.6	3.8	3.8	3.8
¦	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.3	3.3	3.3	3.5	3.5	3.5
¦	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW JERSEY ----- OATS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	55	1.7	1.7	1.7	1.8	1.8	1.8
¦	Surface	79	2.3	2.3	2.3	2.4	2.4	2.4
¦	Incorp.	55	1.4	1.4	1.4	1.4	1.4	1.4
¦	Incorp.	79	2.0	2.0	2.0	2.0	2.0	2.0
Anaerobic	Surface	55	1.5	1.5	1.5	1.7	1.7	1.7
¦	Surface	79	2.1	2.1	2.1	2.3	2.3	2.3
¦	Incorp.	55	1.3	1.1	1.1	1.3	1.1	1.1
¦	Incorp.	79	1.8	1.6	1.6	1.8	1.6	1.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW JERSEY ----- PEACH,NECTARINE,CHERRY,PLUM

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.3	2.3	2.3	2.5	2.5	2.5
	Surface	130	3.0	3.0	3.0	3.1	3.1	3.1
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.1	2.1	2.1	2.3	2.3	2.3
	Surface	130	2.7	2.7	2.7	2.9	2.9	2.9
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW JERSEY ----- RYE

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	30	1.2	1.2	1.2	1.4	1.4	1.4
	Surface	43	1.6	1.6	1.6	1.8	1.8	1.8
	Incorp.	30	0.9	0.9	0.9	0.9	0.9	0.9
	Incorp.	43	1.4	1.3	1.3	1.4	1.3	1.3
Anaerobic	Surface	30	1.1	1.1	1.1	1.3	1.3	1.3
	Surface	43	1.5	1.5	1.5	1.6	1.6	1.6
	Incorp.	30	0.9	0.8	0.7	0.9	0.8	0.7
	Incorp.	43	1.2	1.1	1.1	1.2	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW JERSEY ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	29	3.7	3.7	3.7	4.0	4.0	4.0
	Surface	41	5.2	5.2	5.2	5.4	5.4	5.4
	Incorp.	29	3.4	3.4	3.3	3.4	3.4	3.4
	Incorp.	41	4.9	4.8	4.8	4.9	4.8	4.8
Anaerobic	Surface	29	3.4	3.4	3.4	3.6	3.6	3.6
	Surface	41	4.7	4.7	4.7	5.0	5.0	5.0
	Incorp.	29	3.1	2.7	2.7	3.1	2.7	2.7
	Incorp.	41	4.4	3.9	3.8	4.4	3.9	3.8

* For wet tons/acre divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW JERSEY ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	42	1.7	1.7	1.7	1.9	1.9	1.9
	Surface	60	2.3	2.3	2.3	2.5	2.5	2.5
	Incorp.	42	1.4	1.4	1.4	1.4	1.4	1.4
	Incorp.	60	2.1	2.0	2.0	2.1	2.0	2.0
Anaerobic	Surface	42	1.6	1.6	1.6	1.7	1.7	1.7
	Surface	60	2.1	2.1	2.1	2.3	2.3	2.3
	Incorp.	42	1.3	1.1	1.1	1.3	1.2	1.1
	Incorp.	60	1.9	1.6	1.6	1.9	1.6	1.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

NEW YORK

Crops Included:

- Apples
- Corn
- Forages
- Grapes, Vineyards
- Horticulture
- Oats
- Peach, Nectarine, Cherry, Plum
- Pear
- Rye
- Wheat

Annual Sludge Application Rate, dry tons/acre *
NEW YORK ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.0	3.0	3.0	3.1	3.1	3.1
	Surface	130	3.9	3.9	3.9	3.9	3.9	3.9
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.7	2.7	2.7	2.8	2.8	2.8
	Surface	130	3.5	3.5	3.5	3.6	3.6	3.6
	incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW YORK ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	93	3.7	3.7	3.7	3.9	3.9	3.9
	Surface	133	5.2	5.2	5.2	5.3	5.3	5.3
	Incorp.	93	3.5	3.4	3.4	3.5	3.4	3.4
	Incorp.	133	5.0	4.9	4.9	5.0	4.9	4.9
Anaerobic	Surface	93	3.4	3.4	3.4	3.5	3.5	3.5
	Surface	133	4.7	4.7	4.7	4.9	4.9	4.9
	Incorp.	93	3.2	2.8	2.7	3.2	2.8	2.7
	Incorp.	133	4.5	3.9	3.9	4.5	3.9	3.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW YORK ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.4	0.4	0.4	0.5	0.5	0.5
	Surface	3	0.5	0.5	0.5	0.6	0.6	0.6
	Incorp.	2	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	3	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	2	0.4	0.4	0.4	0.5	0.5	0.5
	Surface	3	0.5	0.5	0.5	0.6	0.6	0.6
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW YORK ----- GRAPES, VINEYARDS

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	1.7	1.7	1.7	1.8	1.8	1.8
	Incorp.	1.5	1.5	1.5	1.5	1.5	1.5
Anaerobic	Surface	1.5	1.5	1.5	1.6	1.6	1.6
	Incorp.	1.4	1.2	1.2	1.4	1.2	1.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW YORK ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	3.6	3.6	3.6	3.7	3.7	3.7
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.3	3.3	3.3	3.3	3.3	3.3
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW YORK ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	65	1.8	1.8	1.8	2.0	2.0	2.0
	Surface	93	2.6	2.6	2.6	2.7	2.7	2.7
	Incorp.	65	1.7	1.7	1.6	1.7	1.7	1.6
	Incorp.	93	2.4	2.4	2.4	2.4	2.4	2.4
Anaerobic	Surface	65	1.7	1.7	1.7	1.8	1.8	1.8
	Surface	93	2.3	2.3	2.3	2.5	2.5	2.5
	Incorp.	65	1.5	1.3	1.3	1.5	1.3	1.3
	Incorp.	93	2.2	1.9	1.9	2.2	1.9	1.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW YORK ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.3	2.3	2.3	2.4	2.4	2.4
	Surface	130	2.9	2.9	2.9	3.0	3.0	3.0
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.1	2.1	2.1	2.2	2.2	2.2
	Surface	130	2.7	2.7	2.7	2.8	2.8	2.8
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW YORK ----- PEARS

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	1.2	1.2	1.2	1.3	1.3	1.3
	Surface	130	1.5	1.5	1.5	1.6	1.6	1.6
	Incorp.	100	1.1	1.1	1.1	1.1	1.1	1.1
	Incorp.	130	1.4	1.4	1.4	1.4	1.4	1.4
Anaerobic	Surface	100	1.1	1.1	1.1	1.2	1.2	1.2
	Surface	130	1.4	1.4	1.4	1.5	1.5	1.5
	Incorp.	100	1.0	0.9	0.8	1.0	0.9	0.9
	Incorp.	130	1.3	1.1	1.1	1.3	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW YORK ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	32	1.2	1.2	1.2	1.3	1.3	1.3
	Surface	46	1.6	1.6	1.6	1.7	1.7	1.7
	Incorp.	32	1.0	1.0	1.0	1.0	1.0	1.0
	Incorp.	46	1.4	1.4	1.4	1.4	1.4	1.4
Anaerobic	Surface	32	1.1	1.1	1.1	1.2	1.2	1.2
	Surface	46	1.5	1.5	1.5	1.6	1.6	1.6
	Incorp.	32	0.9	0.8	0.8	0.9	0.8	0.8
	Incorp.	46	1.3	1.1	1.1	1.3	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
NEW YORK ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	46	1.7	1.7	1.7	1.9	1.9	1.9
	Surface	66	2.4	2.4	2.4	2.5	2.5	2.5
	Incorp.	46	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	66	2.3	2.2	2.2	2.3	2.2	2.2
Anaerobic	Surface	46	1.6	1.6	1.6	1.7	1.7	1.7
	Surface	66	2.2	2.2	2.2	2.3	2.3	2.3
	Incorp.	46	1.4	1.3	1.2	1.4	1.3	1.2
	Incorp.	66	2.1	1.8	1.8	2.1	1.8	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

OHIO

Crops Included:

Apples
Corn
Forages
Grapes, Vineyards
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rye
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
OHIO ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.1	3.1	3.1	3.2	3.2	3.2
	Surface	130	3.9	3.9	3.9	4.1	4.1	4.1
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.8	2.8	2.8	2.9	2.9	2.9
	Surface	130	3.6	3.6	3.6	3.7	3.7	3.7
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OHIO ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	114	4.6	4.6	4.6	4.8	4.8	4.8
	Surface	163	6.4	6.4	6.4	6.7	6.7	6.7
	Incorp.	114	4.3	4.2	4.2	4.3	4.2	4.2
	Incorp.	163	6.1	6.0	6.0	6.1	6.0	6.0
Anaerobic	Surface	114	4.2	4.2	4.2	4.4	4.4	4.4
	Surface	163	5.9	5.9	5.9	6.1	6.1	6.1
	Incorp.	114	3.9	3.4	3.3	3.9	3.4	3.3
	Incorp.	163	5.5	4.8	4.7	5.5	4.8	4.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OHIO ----- FORAGES

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield t/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.5	0.5	0.5	0.7	0.7	0.7
	Surface	4	0.7	0.7	0.7	0.8	0.8	0.8
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	3	0.5	0.5	0.5	0.7	0.7	0.7
	Surface	4	0.6	0.6	0.6	0.8	0.8	0.8
	Incorp.	3	0.3	0.2	0.2	0.3	0.2	0.2
	Incorp.	4	0.4	0.3	0.3	0.4	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OHIO ----- GRAPES, VINEYARDS

		Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	1.7	1.7	1.7	1.9	1.9	1.9
	Incorp.	1.5	1.5	1.5	1.6	1.5	1.5
Anaerobic	Surface	1.6	1.6	1.6	1.7	1.7	1.7
	Incorp.	1.4	1.2	1.2	1.4	1.2	1.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OHIO ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.6	3.6	3.6	3.8	3.8	3.8
¦	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.3	3.3	3.3	3.5	3.5	3.5
¦	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OHIO ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	69	2.0	2.0	2.0	2.2	2.2	2.2
¦	Surface	99	2.8	2.8	2.8	3.0	3.0	3.0
¦	Incorp.	69	1.8	1.8	1.8	1.8	1.8	1.8
¦	Incorp.	99	2.5	2.5	2.5	2.5	2.5	2.5
Anaerobic	Surface	69	1.9	1.9	1.9	2.0	2.0	2.0
¦	Surface	99	2.6	2.6	2.6	2.7	2.7	2.7
¦	Incorp.	69	1.6	1.4	1.4	1.6	1.4	1.4
¦	Incorp.	99	2.3	2.0	2.0	2.3	2.0	2.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OHIO ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.3	2.3	2.3	2.5	2.5	2.5
	Surface	130	3.0	3.0	3.0	3.1	3.1	3.1
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.1	2.1	2.1	2.3	2.3	2.3
	Surface	130	2.7	2.7	2.7	2.9	2.9	2.9
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OHIO ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	35	1.3	1.3	1.3	1.5	1.5	1.5
	Surface	50	1.8	1.8	1.8	2.0	2.0	2.0
	Incorp.	35	1.1	1.1	1.1	1.1	1.1	1.1
	Incorp.	50	1.6	1.6	1.6	1.6	1.6	1.6
Anaerobic	Surface	35	1.2	1.2	1.2	1.4	1.4	1.4
	Surface	50	1.7	1.7	1.7	1.8	1.8	1.8
	Incorp.	35	1.0	0.9	0.9	1.0	0.9	0.9
	Incorp.	50	1.4	1.3	1.2	1.4	1.3	1.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OHIO ----- SOYBEANS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	36	4.5	4.5	4.5	4.8	4.8	4.8
	Surface	51	6.4	6.4	6.4	6.6	6.6	6.6
	Incorp.	36	4.2	4.2	4.2	4.2	4.2	4.2
	Incorp.	51	6.0	6.0	5.9	6.0	6.0	5.9
Anaerobic	Surface	36	4.2	4.2	4.2	4.4	4.4	4.4
	Surface	51	5.8	5.8	5.8	6.0	6.0	6.0
	Incorp.	36	3.9	3.4	3.3	3.9	3.4	3.3
	Incorp.	51	5.5	4.8	4.7	5.5	4.8	4.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OHIO ----- WHEAT

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	49	1.9	1.9	1.9	2.1	2.1	2.1
	Surface	70	2.6	2.6	2.6	2.8	2.8	2.8
	Incorp.	49	1.7	1.7	1.7	1.7	1.7	1.7
	Incorp.	70	2.4	2.4	2.4	2.4	2.4	2.4
Anaerobic	Surface	49	1.8	1.8	1.8	1.9	1.9	1.9
	Surface	70	2.4	2.4	2.4	2.6	2.6	2.6
	Incorp.	49	1.5	1.3	1.3	1.5	1.3	1.3
	Incorp.	70	2.2	1.9	1.9	2.2	1.9	1.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

OKLAHOMA (E)

Crops Included:

Barley
Corn
Cotton
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rye
Sorghum
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(E) ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	44	2.8	2.8	2.8	3.1	3.1	3.1
	Surface	63	3.7	3.7	3.7	4.1	4.1	4.1
	Incorp.	44	2.3	2.2	2.2	2.3	2.2	2.2
	Incorp.	63	3.2	3.2	3.2	3.2	3.2	3.2
Anaerobic	Surface	44	2.5	2.5	2.5	2.9	2.9	2.9
	Surface	63	3.4	3.4	3.4	3.8	3.8	3.8
	Incorp.	44	2.1	1.8	1.8	2.1	1.8	1.8
	Incorp.	63	3.0	2.6	2.5	3.0	2.6	2.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(E) ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	112	4.8	4.8	4.8	5.3	5.3	5.3
	Surface	160	6.6	6.6	6.6	7.1	7.1	7.1
	Incorp.	112	4.2	4.1	4.1	4.2	4.1	4.1
	Incorp.	160	6.0	5.9	5.9	6.0	5.9	5.9
Anaerobic	Surface	112	4.5	4.5	4.5	5.0	5.0	5.0
	Surface	160	6.1	6.1	6.1	6.6	6.6	6.6
	Incorp.	112	3.8	3.3	3.3	3.8	3.3	3.3
	Incorp.	160	5.4	4.7	4.6	5.4	4.7	4.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(E) ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	330	1.5	1.5	1.5	2.0	2.0	2.0
¦	Surface	471	1.9	1.9	1.9	2.3	2.3	2.3
¦	Incorp.	330	0.8	0.8	0.8	0.8	0.8	0.8
¦	Incorp.	471	1.2	1.2	1.2	1.2	1.2	1.2
Anaerobic	Surface	330	1.4	1.4	1.4	1.9	1.9	1.9
¦	Surface	471	1.8	1.8	1.8	2.2	2.2	2.2
¦	Incorp.	330	0.8	0.7	0.7	0.8	0.7	0.7
¦	Incorp.	471	1.1	0.9	0.9	1.1	1.0	0.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(E) ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.7	0.7	0.7	1.0	1.0	1.0
¦	Surface	3	0.8	0.8	0.8	1.1	1.1	1.1
¦	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
¦	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
Anaerobic	Surface	2	0.7	0.7	0.7	1.0	1.0	1.0
¦	Surface	3	0.7	0.7	0.7	1.1	1.1	1.1
¦	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
¦	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(E) ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.8	3.8	3.8	4.1	4.1	4.1
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.5	3.5	3.5	3.8	3.8	3.8
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(E) ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	49	1.7	1.7	1.7	2.1	2.1	2.1
	Surface	70	2.3	2.3	2.3	2.6	2.6	2.6
	Incorp.	49	1.3	1.2	1.2	1.3	1.3	1.3
	Incorp.	70	1.8	1.8	1.8	1.8	1.8	1.8
Anaerobic	Surface	49	1.6	1.6	1.6	2.0	2.0	2.0
	Surface	70	2.1	2.1	2.1	2.5	2.5	2.5
	Incorp.	49	1.2	1.0	1.0	1.2	1.0	1.0
	Incorp.	70	1.6	1.4	1.4	1.6	1.4	1.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(E) ----- PEACH,NECTARINE,CHERRY,PLUM

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.5	2.5	2.5	2.8	2.8	2.8
	Surface	130	3.2	3.2	3.2	3.5	3.5	3.5
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.8
Anaerobic	Surface	100	2.3	2.3	2.3	2.6	2.6	2.6
	Surface	130	2.9	2.9	2.9	3.2	3.2	3.2
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(E) ----- RYE

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	26	1.3	1.3	1.3	1.7	1.7	1.7
	Surface	37	1.7	1.7	1.7	2.0	2.0	2.0
	Incorp.	26	0.8	0.8	0.8	0.8	0.8	0.8
	Incorp.	37	1.2	1.2	1.2	1.2	1.2	1.2
Anaerobic	Surface	26	1.2	1.2	1.2	1.6	1.6	1.6
	Surface	37	1.5	1.5	1.5	1.9	1.9	1.9
	Incorp.	26	0.7	0.7	0.6	0.8	0.7	0.7
	Incorp.	37	1.1	0.9	0.9	1.1	0.9	0.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(E) ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	47	2.3	2.3	2.3	2.8	2.8	2.8
	Surface	67	3.0	3.0	3.0	3.5	3.5	3.5
	Incorp.	47	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	67	2.3	2.3	2.3	2.3	2.3	2.3
Anaerobic	Surface	47	2.1	2.1	2.1	2.6	2.6	2.6
	Surface	67	2.8	2.8	2.8	3.3	3.3	3.3
	Incorp.	47	1.5	1.3	1.3	1.5	1.3	1.3
	Incorp.	67	2.1	1.8	1.8	2.1	1.8	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(E) ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	24	3.5	3.5	3.5	3.9	3.9	3.9
	Surface	34	4.7	4.7	4.7	5.1	5.1	5.1
	Incorp.	24	2.8	2.8	2.8	2.8	2.8	2.8
	Incorp.	34	4.0	4.0	4.0	4.0	4.0	4.0
Anaerobic	Surface	24	3.2	3.2	3.2	3.7	3.7	3.7
	Surface	34	4.3	4.3	4.3	4.8	4.8	4.8
	Incorp.	24	2.6	2.2	2.2	2.6	2.3	2.2
	Incorp.	34	3.7	3.2	3.1	3.7	3.2	3.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(E) ----- WHEAT

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	35	1.7	1.7	1.7	2.0	2.0	2.0
	Surface	50	2.2	2.2	2.2	2.6	2.6	2.6
	Incorp.	35	1.2	1.2	1.2	1.2	1.2	1.2
	Incorp.	50	1.7	1.7	1.7	1.7	1.7	1.7
Anaerobic	Surface	35	1.6	1.6	1.6	1.9	1.9	1.9
	Surface	50	2.0	2.0	2.0	2.4	2.4	2.4
	Incorp.	35	1.1	1.0	0.9	1.1	1.0	0.9
	Incorp.	50	1.6	1.4	1.3	1.6	1.4	1.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

OKLAHOMA (C)

Crops Included:

Barley
Corn
Cotton
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rye
Sorghum
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(C) ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	44	2.6	2.6	2.6	2.8	2.8	2.8
	Surface	63	3.6	3.6	3.6	3.8	3.8	3.8
	Incorp.	44	2.3	2.2	2.2	2.3	2.2	2.2
	Incorp.	63	3.2	3.2	3.2	3.2	3.2	3.2
Anaerobic	Surface	44	2.4	2.4	2.4	2.6	2.6	2.6
	Surface	63	3.3	3.3	3.3	3.5	3.5	3.5
	Incorp.	44	2.1	1.8	1.8	2.1	1.8	1.8
	Incorp.	63	3.0	2.6	2.5	3.0	2.6	2.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(C) ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	112	4.6	4.6	4.6	5.0	5.0	5.0
	Surface	160	6.4	6.4	6.4	6.7	6.7	6.7
	Incorp.	112	4.2	4.1	4.1	4.2	4.1	4.1
	Incorp.	160	6.0	5.9	5.9	6.0	5.9	5.9
Anaerobic	Surface	112	4.2	4.2	4.2	4.6	4.6	4.6
	Surface	160	5.9	5.9	5.9	6.2	6.2	6.2
	Incorp.	112	3.8	3.3	3.3	3.8	3.3	3.3
	Incorp.	160	5.4	4.7	4.6	5.4	4.7	4.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(C) ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	330	1.3	1.3	1.3	1.6	1.6	1.6
	Surface	471	1.6	1.6	1.6	2.0	2.0	2.0
	Incorp.	330	0.8	0.8	0.8	1.2	1.2	1.2
	Incorp.	471	1.2	1.2	1.2	1.5	1.5	1.5
Anaerobic	Surface	330	1.2	1.2	1.2	1.9	1.9	1.9
	Surface	471	1.5	1.5	1.5	0.8	0.7	0.7
	Incorp.	330	0.8	0.7	0.7	1.1	0.9	0.9
	Incorp.	471	1.1	0.9	0.9			

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(C) ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.5	0.5	0.5	0.7	0.7	0.7
	Surface	3	0.6	0.6	0.6	0.8	0.8	0.8
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
Anaerobic	Surface	2	0.5	0.5	0.5	0.7	0.7	0.7
	Surface	3	0.6	0.6	0.6	0.8	0.8	0.8
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(C) ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.7	3.7	3.7	3.9	3.9	3.9
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.4	3.4	3.4	3.6	3.6	3.6
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(C) ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	49	1.6	1.6	1.6	1.8	1.8	1.8
	Surface	70	2.1	2.1	2.1	2.4	2.4	2.4
	Incorp.	49	1.3	1.2	1.2	1.3	1.3	1.2
	Incorp.	70	1.8	1.8	1.8	1.8	1.8	1.8
Anaerobic	Surface	49	1.5	1.5	1.5	1.7	1.7	1.7
	Surface	70	2.0	2.0	2.0	2.2	2.2	2.2
	Incorp.	49	1.2	1.0	1.0	1.2	1.0	1.0
	Incorp.	70	1.6	1.4	1.4	1.6	1.4	1.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

total solids fraction [illegible]

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(C) ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.4	2.4	2.4	2.6	2.6	2.6
	Surface	130	3.0	3.0	3.0	3.2	3.2	3.2
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.2	2.2	2.2	2.4	2.4	2.4
	Surface	130	2.8	2.8	2.8	3.0	3.0	3.0
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(C) ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	26	1.1	1.1	1.1	1.4	1.4	1.4
	Surface	37	1.5	1.5	1.5	1.7	1.7	1.7
	Incorp.	26	0.8	0.8	0.8	0.8	0.8	0.8
	Incorp.	37	1.2	1.2	1.2	1.2	1.2	1.2
Anaerobic	Surface	26	1.1	1.1	1.1	1.3	1.3	1.3
	Surface	37	1.4	1.4	1.4	1.6	1.6	1.6
	Incorp.	26	0.7	0.7	0.6	0.8	0.7	0.6
	Incorp.	37	1.1	0.9	0.9	1.1	0.9	0.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(C) ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	47	2.1	2.1	2.1	2.4	2.4	2.4
	Surface	67	2.8	2.8	2.8	3.1	3.1	3.1
	Incorp.	47	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	67	2.3	2.3	2.3	2.3	2.3	2.3
Anaerobic	Surface	47	1.9	1.9	1.9	2.2	2.2	2.2
	Surface	67	2.6	2.6	2.6	2.9	2.9	2.9
	Incorp.	47	1.5	1.3	1.3	1.5	1.3	1.3
	Incorp.	67	2.1	1.8	1.8	2.1	1.8	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(C) ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	24	3.2	3.2	3.2	3.5	3.5	3.5
	Surface	34	4.5	4.5	4.5	4.8	4.8	4.8
	Incorp.	24	2.8	2.8	2.8	2.8	2.8	2.8
	Incorp.	34	4.0	4.0	4.0	4.0	4.0	4.0
Anaerobic	Surface	24	3.0	3.0	3.0	3.3	3.3	3.3
	Surface	34	4.1	4.1	4.1	4.4	4.4	4.4
	Incorp.	24	2.6	2.2	2.2	2.6	2.2	2.2
	Incorp.	34	3.7	3.2	3.1	3.7	3.2	3.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(C) ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	35	1.5	1.5	1.5	1.8	1.8	1.8
	Surface	50	2.0	2.0	2.0	2.3	2.3	2.3
	Incorp.	35	1.2	1.2	1.2	1.2	1.2	1.2
	Incorp.	50	1.7	1.7	1.7	1.7	1.7	1.7
Anaerobic	Surface	35	1.4	1.4	1.4	1.6	1.6	1.6
	Surface	50	1.9	1.9	1.9	2.1	2.1	2.1
	Incorp.	35	1.1	1.0	0.9	1.1	1.0	0.9
	Incorp.	50	1.6	1.4	1.3	1.6	1.4	1.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

OKLAHOMA (W)

Crops Included:

Barley
Corn
Cotton
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rye
Sorghum
Soybeans
Wheat

OKLAHOMA(W) ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	44	2.5	2.5	2.5	2.7	2.7	2.7
	Surface	63	3.5	3.5	3.5	3.7	3.7	3.7
	Incorp.	44	2.3	2.2	2.2	2.3	2.2	2.2
	Incorp.	63	3.2	3.2	3.2	3.2	3.2	3.2
Anaerobic	Surface	44	2.3	2.3	2.3	2.5	2.5	2.5
	Surface	63	3.2	3.2	3.2	3.4	3.4	3.4
	Incorp.	44	2.1	1.8	1.8	2.1	1.8	1.8
	Incorp.	63	3.0	2.6	2.5	3.0	2.6	2.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(W) ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	112	4.5	4.5	4.5	4.8	4.8	4.8
	Surface	160	6.3	6.3	6.3	6.5	6.5	6.5
	Incorp.	112	4.2	4.1	4.1	4.2	4.1	4.1
	Incorp.	160	6.0	5.9	5.9	6.0	5.9	5.9
Anaerobic	Surface	112	4.1	4.1	4.1	4.4	4.4	4.4
	Surface	160	5.8	5.8	5.8	6.0	6.0	6.0
	Incorp.	112	3.8	3.3	3.2	3.8	3.3	3.3
	Incorp.	160	5.4	4.7	4.6	5.4	4.7	4.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(W) ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	330	1.2	1.2	1.2	1.4	1.4	1.4
	Surface	471	1.5	1.5	1.5	1.8	1.8	1.8
	Incorp.	330	0.8	0.8	0.8	0.8	0.8	0.8
	Incorp.	471	1.2	1.2	1.2	1.2	1.2	1.2
Anaerobic	Surface	330	1.1	1.1	1.1	1.3	1.3	1.3
	Surface	471	1.4	1.4	1.4	1.7	1.7	1.7
	Incorp.	330	0.8	0.7	0.6	0.8	0.7	0.7
	Incorp.	471	1.1	0.9	0.9	1.1	0.9	0.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(W) ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.5	0.5	0.5	0.6	0.6	0.6
	Surface	3	0.6	0.6	0.6	0.7	0.7	0.7
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
Anaerobic	Surface	2	0.4	0.4	0.4	0.6	0.6	0.6
	Surface	3	0.5	0.5	0.5	0.7	0.7	0.7
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(W) ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.6	3.6	3.6	3.8	3.8	3.8
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.3	3.3	3.3	3.5	3.5	3.5
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(W) ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	49	1.5	1.5	1.5	1.7	1.7	1.7
	Surface	70	2.0	2.0	2.0	2.2	2.2	2.2
	Incorp.	49	1.3	1.2	1.2	1.3	1.2	1.2
	Incorp.	70	1.8	1.8	1.8	1.8	1.8	1.8
Anaerobic	Surface	49	1.4	1.4	1.4	1.6	1.6	1.6
	Surface	70	1.9	1.9	1.9	2.1	2.1	2.1
	Incorp.	49	1.2	1.0	1.0	1.2	1.0	1.0
	Incorp.	70	1.6	1.4	1.4	1.6	1.4	1.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(W) ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.3	2.3	2.3	2.5	2.5	2.5
	Surface	130	3.0	3.0	3.0	3.1	3.1	3.1
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.1	2.1	2.1	2.3	2.3	2.3
	Surface	130	2.7	2.7	2.7	2.9	2.9	2.9
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(W) ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	26	1.1	1.1	1.1	1.2	1.2	1.2
	Surface	37	1.4	1.4	1.4	1.6	1.6	1.6
	Incorp.	26	0.8	0.8	0.8	0.8	0.8	0.8
	Incorp.	37	1.2	1.2	1.2	1.2	1.2	1.2
Anaerobic	Surface	26	1.0	1.0	1.0	1.2	1.2	1.2
	Surface	37	1.3	1.3	1.3	1.5	1.5	1.5
	Incorp.	26	0.7	0.7	0.6	0.7	0.7	0.6
	Incorp.	37	1.1	0.9	0.9	1.1	0.9	0.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(W) ----- SORGHUM

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	47	2.0	2.0	2.0	2.2	2.2	2.2
	Surface	67	2.6	2.6	2.6	2.9	2.9	2.9
	Incorp.	47	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	67	2.3	2.3	2.3	2.3	2.3	2.3
Anaerobic	Surface	47	1.8	1.8	1.8	2.1	2.1	2.1
	Surface	67	2.4	2.4	2.4	2.7	2.7	2.7
	Incorp.	47	1.5	1.3	1.3	1.5	1.3	1.3
	Incorp.	67	2.1	1.8	1.8	2.1	1.8	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(W) ----- SOYBEANS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	24	3.1	3.1	3.1	3.4	3.4	3.4
	Surface	34	4.3	4.3	4.3	4.6	4.6	4.6
	Incorp.	24	2.8	2.8	2.8	2.8	2.8	2.8
	Incorp.	34	4.0	4.0	4.0	4.0	4.0	4.0
Anaerobic	Surface	24	2.9	2.9	2.9	3.1	3.1	3.1
	Surface	34	4.0	4.0	4.0	4.2	4.2	4.2
	Incorp.	24	2.6	2.2	2.2	2.6	2.2	2.2
	Incorp.	34	3.7	3.2	3.1	3.7	3.2	3.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OKLAHOMA(W) ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	35	1.4	1.4	1.4	1.6	1.6	1.6
	Surface	50	2.0	2.0	2.0	2.1	2.1	2.1
	Incorp.	35	1.2	1.2	1.2	1.2	1.2	1.2
	Incorp.	50	1.7	1.7	1.7	1.7	1.7	1.7
Anaerobic	Surface	35	1.3	1.3	1.3	1.5	1.5	1.5
	Surface	50	1.8	1.8	1.8	2.0	2.0	2.0
	Incorp.	35	1.1	1.0	0.9	1.1	1.0	0.9
	Incorp.	50	1.6	1.4	1.3	1.6	1.4	1.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

OREGON

Crops Included:

Apples
Barley
Corn
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Pear
Rye
Tree Farming
Wheat

Annual Sludge Application Rate, dry tons/acre *
OREGON ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.9	2.9	2.9	2.9	2.9	2.9
:	Surface	130	3.8	3.8	3.8	3.8	3.8	3.8
:	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
:	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.6	2.6	2.6	2.7	2.7	2.7
:	Surface	130	3.4	3.4	3.4	3.5	3.5	3.5
:	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
:	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OREGON ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	62	3.2	3.2	3.2	3.3	3.3	3.3
:	Surface	89	4.6	4.6	4.6	4.7	4.7	4.7
:	Incorp.	62	3.2	3.1	3.1	3.2	3.1	3.1
:	Incorp.	89	4.6	4.5	4.5	4.6	4.5	4.5
Anaerobic	Surface	62	3.0	3.0	3.0	3.0	3.0	3.0
:	Surface	89	4.2	4.2	4.2	4.2	4.2	4.2
:	Incorp.	62	2.9	2.5	2.5	2.9	2.5	2.5
:	Incorp.	89	4.2	3.6	3.6	4.2	3.6	3.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OREGON ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	162	6.1	6.1	6.1	6.2	6.2	6.2
	Surface	231	8.7	8.7	8.7	8.7	8.7	8.7
	Incorp.	162	6.0	5.9	5.9	6.0	5.9	5.9
	Incorp.	231	8.6	8.5	8.5	8.6	8.5	8.5
Anaerobic	Surface	162	5.6	5.6	5.6	5.6	5.6	5.6
	Surface	231	7.9	7.9	7.9	8.0	8.0	8.0
	Incorp.	162	5.5	4.8	4.7	5.5	4.8	4.7
	Incorp.	231	7.8	6.8	6.7	7.8	6.8	6.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OREGON ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.4	0.4	0.4	0.4	0.4	0.4
	Surface	4	0.5	0.5	0.5	0.5	0.5	0.5
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.5	0.5	0.5	0.5	0.5	0.5
Anaerobic	Surface	3	0.3	0.3	0.3	0.4	0.4	0.4
	Surface	4	0.5	0.5	0.5	0.5	0.5	0.5
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OREGON ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.5	3.5	3.5	3.5	3.5	3.5
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.2	3.2	3.2	3.2	3.2	3.2
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OREGON ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	80	2.1	2.1	2.1	2.1	2.1	2.1
	Surface	114	3.0	3.0	3.0	3.0	3.0	3.0
	Incorp.	80	2.1	2.0	2.0	2.1	2.0	2.0
	Incorp.	114	2.9	2.9	2.9	2.9	2.9	2.9
Anaerobic	Surface	80	1.9	1.9	1.9	2.0	2.0	2.0
	Surface	114	2.7	2.7	2.7	2.8	2.8	2.8
	Incorp.	80	1.9	1.6	1.6	1.9	1.6	1.6
	Incorp.	114	2.7	2.3	2.3	2.7	2.3	2.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OREGON ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.2	2.2	2.2	2.2	2.2	2.2
	Surface	130	2.8	2.8	2.8	2.9	2.9	2.9
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.0	2.0	2.0	2.0	2.0	2.0
	Surface	130	2.6	2.6	2.6	2.6	2.6	2.6
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OREGON ----- PEARS

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	1.1	1.1	1.1	1.2	1.2	.2
	Surface	130	1.5	1.5	1.5	1.5	1.5	.5
	Incorp.	100	1.1	1.1	1.1	1.1	1.1	.1
	Incorp.	130	1.4	1.4	1.4	1.4	1.4	.4
Anaerobic	Surface	100	1.0	1.0	1.0	1.1	1.1	.1
	Surface	130	1.3	1.3	1.3	1.4	1.4	.4
	Incorp.	100	1.0	0.9	0.8	1.0	0.9	.8
	Incorp.	130	1.3	1.1	1.1	1.3	1.1	.1

* For wet tons/acre, divide the dry rate by th
total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
OREGON ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	29	1.0	1.0	1.0	1.0	1.0	1.0
	Surface	41	1.4	1.4	1.4	1.4	1.4	1.4
	Incorp.	29	0.9	0.9	0.9	0.9	0.9	0.9
	Incorp.	41	1.3	1.3	1.3	1.3	1.3	1.3
Anaerobic	Surface	29	0.9	0.9	0.9	0.9	0.9	0.9
	Surface	41	1.2	1.2	1.2	1.3	1.3	1.3
	Incorp.	29	0.8	0.7	0.7	0.8	0.7	0.7
	Incorp.	41	1.2	1.0	1.0	1.2	1.0	1.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre
OREGON ----- TREE FARMING *

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	5.8	5.8	5.8	5.8	5.8	5.8
	Incorp.	5.7	5.6	5.6	5.7	5.6	5.6
Anaerobic	Surface	5.3	5.3	5.3	5.3	5.3	5.3
	Incorp.	5.2	4.6	4.5	5.2	4.6	4.5

* Includes white pines, Douglas-fir, southern pine, spruce, aspen, oak, and hickory.

Annual Sludge Application Rate, dry tons/acre *
OREGON ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	60	2.1	2.1	2.1	2.1	2.1	2.1
	Surface	86	3.0	3.0	3.0	3.0	3.0	3.0
	Incorp.	60	2.1	2.0	2.0	2.1	2.0	2.0
	Incorp.	86	2.9	2.9	2.9	2.9	2.9	2.9
Anaerobic	Surface	60	1.9	1.9	1.9	2.0	2.0	2.0
	Surface	86	2.7	2.7	2.7	2.8	2.8	2.8
	Incorp.	60	1.9	1.6	1.6	1.9	1.6	1.6
	Incorp.	86	2.7	2.3	2.3	2.7	2.3	2.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

PENNSYLVANIA

Crops Included:

Apples
Barley
Corn
Forages
Grapes, Vineyards
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Pear
Rye
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
PENNSYLVANIA ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.0	3.0	3.0	3.1	3.1	3.1
	Surface	130	3.9	3.9	3.9	4.0	4.0	4.0
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.8	2.8	2.8	2.9	2.9	2.9
	Surface	130	3.5	3.5	3.5	3.7	3.7	3.7
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
PENNSYLVANIA ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	55	3.0	3.0	3.0	3.2	3.2	3.2
	Surface	79	4.3	4.3	4.3	4.4	4.4	4.4
	Incorp.	55	2.8	2.8	2.8	2.8	2.8	2.8
	Incorp.	79	4.1	4.0	4.0	4.1	4.0	4.0
Anaerobic	Surface	55	2.8	2.8	2.8	2.9	2.9	2.9
	Surface	79	3.9	3.9	3.9	4.0	4.0	4.0
	Incorp.	55	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	79	3.7	3.2	3.2	3.7	3.2	3.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
PENNSYLVANIA ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	97	3.9	3.9	3.9	4.1	4.1	4.1
	Surface	139	5.4	5.4	5.4	5.6	5.6	5.6
	Incorp.	97	3.6	3.6	3.6	3.6	3.6	3.6
	Incorp.	139	5.2	5.1	5.1	5.2	5.1	5.1
Anaerobic	Surface	97	3.6	3.6	3.6	3.8	3.8	3.8
	Surface	139	5.0	5.0	5.0	5.2	5.2	5.2
	Incorp.	97	3.3	2.9	2.8	3.3	2.9	2.8
	Incorp.	139	4.7	4.1	4.0	4.7	4.1	4.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
PENNSYLVANIA ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	2	0.5	0.5	0.5	0.6	0.6	0.6
	Surface	3	0.6	0.6	0.6	0.7	0.7	0.7
	Incorp.	2	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	3	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	2	0.4	0.4	0.4	0.6	0.6	0.6
	Surface	3	0.5	0.5	0.5	0.7	0.7	0.7
	Incorp.	2	0.3	0.2	0.2	0.3	0.2	0.2
	Incorp.	3	0.4	0.3	0.3	0.4	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
PENNSYLVANIA ----- GRAPES, VINEYARDS

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	1.7	1.7	1.7	1.8	1.8	1.8
¦	Incorp.	1.5	1.5	1.5	1.6	1.5	1.5
Anaerobic	Surface	1.6	1.6	1.6	1.7	1.7	1.7
¦	Incorp.	1.4	1.2	1.2	1.4	1.2	1.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
PENNSYLVANIA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	3.6	3.6	3.6	3.7	3.7	3.7
¦	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.3	3.3	3.3	3.4	3.4	3.4
¦	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
PENNSYLVANIA ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	59	1.7	1.7	1.7	1.9	1.9	1.9
	Surface	84	2.4	2.4	2.4	2.5	2.5	2.5
	Incorp.	59	1.5	1.5	1.5	1.5	1.5	1.5
	Incorp.	84	2.2	2.1	2.1	2.2	2.1	2.1
Anaerobic	Surface	59	1.6	1.6	1.6	1.7	1.7	1.7
	Surface	84	2.2	2.2	2.2	2.3	2.3	2.3
	Incorp.	59	1.4	1.2	1.2	1.4	1.2	1.2
	Incorp.	84	2.0	1.7	1.7	2.0	1.7	1.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
PENNSYLVANIA ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.3	2.3	2.3	2.4	2.4	2.4
	Surface	130	3.0	3.0	3.0	3.1	3.1	3.1
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.1	2.1	2.1	2.2	2.2	2.2
	Surface	130	2.7	2.7	2.7	2.8	2.8	2.8
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
PENNSYLVANIA ----- PEARS

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	1.2	1.2	1.2	1.4	1.4	1.4
	Surface	130	1.6	1.6	1.6	1.7	1.7	1.7
	Incorp.	100	1.1	1.1	1.1	1.1	1.1	1.1
	Incorp.	130	1.4	1.4	1.4	1.4	1.4	1.4
Anaerobic	Surface	100	1.1	1.1	1.1	1.3	1.3	1.3
	Surface	130	1.4	1.4	1.4	1.6	1.6	1.6
	Incorp.	100	1.0	0.9	0.8	1.0	0.9	0.9
	Incorp.	130	1.3	1.1	1.1	1.3	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
PENNSYLVANIA ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	34	1.3	1.3	1.3	1.4	1.4	1.4
	Surface	49	1.7	1.7	1.7	1.9	1.9	1.9
	Incorp.	34	1.1	1.1	1.1	1.1	1.1	1.1
	Incorp.	49	1.5	1.5	1.5	1.5	1.5	1.5
Anaerobic	Surface	34	1.2	1.2	1.2	1.3	1.3	1.3
	Surface	49	1.6	1.6	1.6	1.7	1.7	1.7
	Incorp.	34	1.0	0.9	0.8	1.0	0.9	0.8
	Incorp.	49	1.4	1.2	1.2	1.4	1.2	1.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
PENNSVANIA ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	31	3.9	3.9	3.9	4.1	4.1	4.1
	Surface	44	5.5	5.5	5.5	5.7	5.7	5.7
	Incorp.	31	3.6	3.6	3.6	3.6	3.6	3.6
	Incorp.	44	5.2	5.1	5.1	5.2	5.1	5.1
Anaerobic	Surface	31	3.6	3.6	3.6	3.8	3.8	3.8
	Surface	44	5.0	5.0	5.0	5.2	5.2	5.2
	Incorp.	31	3.3	2.9	2.8	3.3	2.9	2.8
	Incorp.	44	4.7	4.1	4.0	4.7	4.1	4.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
PENNSYLVANIA ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	38	1.5	1.5	1.5	1.7	1.7	1.7
	Surface	54	2.1	2.1	2.1	2.2	2.2	2.2
	Incorp.	38	1.3	1.3	1.3	1.3	1.3	1.3
	Incorp.	54	1.9	1.8	1.8	1.9	1.8	1.8
Anaerobic	Surface	38	1.4	1.4	1.4	1.5	1.5	1.5
	Surface	54	1.9	1.9	1.9	2.0	2.0	2.0
	Incorp.	38	1.2	1.0	1.0	1.2	1.0	1.0
	Incorp.	54	1.7	1.5	1.5	1.7	1.5	1.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

SOUTH DAKOTA

Crops Included:

Barley
Corn
Forages
Horticulture
Oats
Rye
Sorghum
Soybeans
Sun Flower
Wheat

Annual Sludge Application Rate, dry tons/acre *
S. DAKOTA ----- BARLEY

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	43	2.3	2.3	2.3	2.4	2.4	2.4
	Surface	61	3.3	3.3	3.3	3.4	3.4	3.4
	Incorp.	43	2.2	2.2	2.2	2.2	2.2	2.2
	Incorp.	61	3.2	3.1	3.1	3.2	3.1	3.1
Anaerobic	Surface	43	2.1	2.1	2.1	2.2	2.2	2.2
	Surface	61	3.0	3.0	3.0	3.1	3.1	3.1
	Incorp.	43	2.0	1.8	1.7	2.0	1.8	1.7
	Incorp.	61	2.9	2.5	2.5	2.9	2.5	2.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
S. DAKOTA ----- CORN

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	72	2.9	2.9	2.9	3.0	3.0	3.0
	Surface	103	4.0	4.0	4.0	4.1	4.1	4.1
	Incorp.	72	2.7	2.6	2.6	2.7	2.6	2.6
	Incorp.	103	3.8	3.8	3.8	3.8	3.8	3.8
Anaerobic	Surface	72	2.6	2.6	2.6	2.8	2.8	2.8
	Surface	103	3.7	3.7	3.7	3.8	3.8	3.8
	Incorp.	72	2.4	2.1	2.1	2.4	2.1	2.1
	Incorp.	103	3.5	3.0	3.0	3.5	3.0	3.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
S. DAKOTA ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.3	0.3	0.3	0.4	0.4	0.4
¦	Surface	3	0.4	0.4	0.4	0.5	0.5	0.5
¦	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
¦	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
Anaerobic	Surface	2	0.3	0.3	0.3	0.4	0.4	0.4
¦	Surface	3	0.4	0.4	0.4	0.5	0.5	0.5
¦	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
¦	Incorp.	3	0.3	0.2	0.2	0.3	0.2	0.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
SOUTH DAKOTA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.5	3.5	3.5	3.6	3.6	3.6
¦	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.2	3.2	3.2	3.3	3.3	3.3
¦	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
S. DAKOTA ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	58	1.6	1.6	1.6	1.7	1.7	1.7
	Surface	83	2.3	2.3	2.3	2.4	2.4	2.4
	Incorp.	58	1.5	1.5	1.5	1.5	1.5	1.5
	Incorp.	83	2.1	2.1	2.1	2.1	2.1	2.1
Anaerobic	Surface	58	1.5	1.5	1.5	1.6	1.6	1.6
	Surface	83	2.1	2.1	2.1	2.2	2.2	2.2
	Incorp.	58	1.4	1.2	1.2	1.4	1.2	1.2
	Incorp.	83	1.9	1.7	1.7	1.9	1.7	1.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
S. DAKOTA ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	38	1.3	1.3	1.3	1.4	1.4	1.4
	Surface	54	1.8	1.8	1.8	1.9	1.9	1.9
	Incorp.	38	1.2	1.2	1.2	1.2	1.2	1.2
	Incorp.	54	1.7	1.7	1.7	1.7	1.7	1.7
Anaerobic	Surface	38	1.2	1.2	1.2	1.3	1.3	1.3
	Surface	54	1.7	1.7	1.7	1.8	1.8	1.8
	Incorp.	38	1.1	1.0	0.9	1.1	1.0	0.9
	Incorp.	54	1.6	1.4	1.3	1.6	1.4	1.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
S. DAKOTA ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	47	1.8	1.8	1.8	1.9	1.9	1.9
	Surface	67	2.5	2.5	2.5	2.6	2.6	2.6
	Incorp.	47	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	67	2.3	2.3	2.3	2.3	2.3	2.3
Anaerobic	Surface	47	1.7	1.7	1.7	1.8	1.8	1.8
	Surface	67	2.3	2.3	2.3	2.4	2.4	2.4
	Incorp.	47	1.5	1.3	1.3	1.5	1.3	1.3
	Incorp.	67	2.1	1.8	1.8	2.1	1.8	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
S. DAKOTA ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	31	3.8	3.8	3.8	3.9	3.9	3.9
	Surface	44	5.4	5.4	5.4	5.5	5.5	5.5
	Incorp.	31	3.6	3.6	3.6	3.6	3.6	3.6
	Incorp.	44	5.2	5.1	5.1	5.2	5.1	5.1
Anaerobic	Surface	31	3.5	3.5	3.5	3.6	3.6	3.6
	Surface	44	4.9	4.9	4.9	5.0	5.0	5.0
	Incorp.	31	3.3	2.9	2.8	3.3	2.9	2.8
	Incorp.	44	4.7	4.1	4.0	4.7	4.1	4.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
S. DAKOTA ----- SUNFLOWER

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	1059	1.5	1.5	1.5	1.7	1.7	1.7
	Surface	1513	2.1	2.1	2.1	2.3	2.3	2.3
	Incorp.	1059	1.4	1.3	1.3	1.4	1.3	1.3
	Incorp.	1513	2.0	1.9	1.9	2.0	1.9	1.9
Anaerobic	Surface	1059	1.4	1.4	1.4	1.6	1.6	1.6
	Surface	1513	2.0	2.0	2.0	2.1	2.1	2.1
	Incorp.	1059	1.2	1.1	1.1	1.2	1.1	1.1
	Incorp.	1513	1.8	1.6	1.5	1.8	1.6	1.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
S. DAKOTA ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	33	1.3	1.3	1.3	1.4	1.4	1.4
	Surface	47	1.7	1.7	1.7	1.8	1.8	1.8
	Incorp.	33	1.1	1.1	1.1	1.1	1.1	1.1
	Incorp.	47	1.6	1.6	1.6	1.6	1.6	1.6
Anaerobic	Surface	33	1.2	1.2	1.2	1.3	1.3	1.3
	Surface	47	1.6	1.6	1.6	1.7	1.7	1.7
	Incorp.	33	1.0	0.9	0.9	1.0	0.9	0.9
	Incorp.	47	1.5	1.3	1.3	1.5	1.3	1.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

TEXAS (E)

Crops Included:

Barley
Citrus
Corn
Cotton
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rice
Rye
Sorghum
Soybeans
Sun Flower
Wheat

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	55	3.4	3.4	3.4	3.8	3.8	3.8
	Surface	79	4.6	4.6	4.6	5.0	5.0	5.0
	Incorp.	55	2.8	2.8	2.8	2.8	2.8	2.8
	Incorp.	79	4.1	4.0	4.0	4.1	4.0	4.0
Anaerobic	Surface	55	3.1	3.1	3.1	3.6	3.6	3.6
	Surface	79	4.2	4.2	4.2	4.7	4.7	4.7
	Incorp.	55	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	79	3.7	3.2	3.2	3.7	3.2	3.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- CITRUS

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	4.4	4.4	4.4	4.7	4.7	4.7
	Incorp.	3.9	3.9	3.9	3.9	3.9	3.9
Anaerobic	Surface	4.0	4.0	4.0	4.3	4.3	4.3
	Incorp.	3.6	3.1	3.1	3.6	3.1	3.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	117	5.1	5.1	5.1	5.7	5.7	5.7
	Surface	167	7.0	7.0	7.0	7.6	7.6	7.6
	Incorp.	117	4.4	4.3	4.3	4.4	4.3	4.3
	Incorp.	167	6.2	6.1	6.1	6.2	6.1	6.1
Anaerobic	Surface	117	4.8	4.8	4.8	5.3	5.3	5.3
	Surface	167	6.5	6.5	6.5	7.0	7.0	7.0
	Incorp.	117	4.0	3.5	3.4	4.0	3.5	3.4
	Incorp.	167	5.7	5.0	4.9	5.7	5.0	4.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	376	1.7	1.7	1.7	2.3	2.3	2.3
	Surface	537	2.1	2.1	2.1	2.7	2.7	2.7
	Incorp.	376	0.9	0.9	0.9	1.0	0.9	0.9
	Incorp.	537	1.4	1.3	1.3	1.4	1.3	1.3
Anaerobic	Surface	376	1.6	1.6	1.6	2.2	2.2	2.2
	Surface	537	2.0	2.0	2.0	2.6	2.6	2.6
	Incorp.	376	0.9	0.8	0.7	0.9	0.8	0.8
	Incorp.	537	1.2	1.1	1.1	1.2	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- FORAGES

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield t/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.8	0.8	0.8	1.2	1.2	1.2
	Surface	4	0.9	0.9	0.9	1.3	1.3	1.3
	Incorp.	2	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	2	0.8	0.8	0.8	1.2	1.2	1.2
	Surface	4	0.9	0.9	0.9	1.3	1.3	1.3
	Incorp.	2	0.3	0.2	0.2	0.3	0.2	0.2
	Incorp.	4	0.4	0.3	0.3	0.4	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- HORTICULTURE

		Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.9	3.9	3.9	4.2	4.2	4.2
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.6	3.6	3.6	3.9	3.9	3.9
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	48	1.8	1.8	1.8	2.2	2.2	2.2
	Surface	69	2.3	2.3	2.3	2.7	2.7	2.7
	Incorp.	48	1.2	1.2	1.2	1.2	1.2	1.2
	Incorp.	69	1.8	1.7	1.7	1.8	1.8	1.8
Anaerobic	Surface	48	1.7	1.7	1.7	2.1	2.1	2.1
	Surface	69	2.2	2.2	2.2	2.6	2.6	2.6
	Incorp.	48	1.1	1.0	1.0	1.1	1.0	1.0
	Incorp.	69	1.6	1.4	1.4	1.6	1.4	1.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.6	2.6	2.6	2.9	2.9	2.9
	Surface	130	3.2	3.2	3.2	3.6	3.6	3.6
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.8
Anaerobic	Surface	100	2.4	2.4	2.4	2.7	2.7	2.7
	Surface	130	3.0	3.0	3.0	3.3	3.3	3.3
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- RICE

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield lb/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	4700	2.9	2.9	2.9	3.3	3.3	3.3
	Surface	6714	3.9	3.9	3.9	4.3	4.3	4.3
	Incorp.	4700	2.4	2.3	2.3	2.4	2.3	2.3
	Incorp.	6714	3.4	3.3	3.3	3.4	3.3	3.3
Anaerobic	Surface	4700	2.7	2.7	2.7	3.1	3.1	3.1
	Surface	6714	3.6	3.6	3.6	4.0	4.0	4.0
	Incorp.	4700	2.1	1.9	1.8	2.2	1.9	1.8
	Incorp.	6714	3.1	2.7	2.6	3.1	2.7	2.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- RYE

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	18	1.1	1.1	1.1	1.5	1.5	1.5
	Surface	26	1.4	1.4	1.4	1.8	1.8	1.8
	Incorp.	18	0.6	0.6	0.6	0.6	0.6	0.6
	Incorp.	26	0.8	0.8	0.8	0.8	0.8	0.8
Anaerobic	Surface	18	1.1	1.1	1.1	1.5	1.5	1.5
	Surface	26	1.3	1.3	1.3	1.7	1.7	1.7
	Incorp.	18	0.5	0.5	0.4	0.5	0.5	0.5
	Incorp.	26	0.7	0.7	0.6	0.7	0.7	0.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	62	2.9	2.9	2.9	3.5	3.5	3.5
	Surface	89	3.8	3.8	3.8	4.4	4.4	4.4
	Incorp.	62	2.1	2.1	2.1	2.1	2.1	2.1
	Incorp.	89	3.1	3.0	3.0	3.1	3.0	3.0
Anaerobic	Surface	62	2.7	2.7	2.7	3.3	3.3	3.3
	Surface	89	3.6	3.6	3.6	4.1	4.1	4.1
	Incorp.	62	1.9	1.7	1.7	2.0	1.7	1.7
	Incorp.	89	2.8	2.4	2.4	2.8	2.4	2.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	25	3.7	3.7	3.7	4.2	4.2	4.2
	Surface	36	4.9	4.9	4.9	5.5	5.5	5.5
	Incorp.	25	2.9	2.9	2.9	2.9	2.9	2.9
	Incorp.	36	4.2	4.1	4.1	4.2	4.1	4.1
Anaerobic	Surface	25	3.4	3.4	3.4	3.9	3.9	3.9
	Surface	36	4.6	4.6	4.6	5.1	5.1	5.1
	Incorp.	25	2.7	2.3	2.3	2.7	2.3	2.3
	Incorp.	36	3.8	3.3	3.3	3.8	3.3	3.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- SUNFLOWER

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	1200	2.3	2.3	2.3	2.9	2.9	2.9
	Surface	1714	3.0	3.0	3.0	3.6	3.6	3.6
	Incorp.	1200	1.6	1.5	1.5	1.6	1.5	1.5
	Incorp.	1714	2.2	2.2	2.2	2.2	2.2	2.2
Anaerobic	Surface	1200	2.2	2.2	2.2	2.8	2.8	2.8
	Surface	1714	2.8	2.8	2.8	3.4	3.4	3.4
	Incorp.	1200	1.4	1.2	1.2	1.4	1.2	1.2
	Incorp.	1714	2.0	1.8	1.7	2.0	1.8	1.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(E) ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	35	1.8	1.8	1.8	2.2	2.2	2.2
	Surface	50	2.3	2.3	2.3	2.7	2.7	2.7
	Incorp.	35	1.2	1.2	1.2	1.2	1.2	1.2
	Incorp.	50	1.7	1.7	1.7	1.7	1.7	1.7
Anaerobic	Surface	35	1.7	1.7	1.7	2.1	2.1	2.1
	Surface	50	2.1	2.1	2.1	2.5	2.5	2.5
	Incorp.	35	1.1	1.0	0.9	1.1	1.0	1.0
	Incorp.	50	1.6	1.4	1.3	1.6	1.4	1.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

TEXAS (C)

Crops Included:

Barley
Citrus
Corn
Cotton
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rice
Rye
Sorghum
Soybeans
Sun Flower
Wheat

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	55	3.2	3.2	3.2	3.5	3.5	3.5
	Surface	79	4.4	4.4	4.4	4.7	4.7	4.7
	Incorp.	55	2.8	2.8	2.8	2.8	2.8	2.8
	Incorp.	79	4.1	4.0	4.0	4.1	4.0	4.0
Anaerobic	Surface	55	2.9	2.9	2.9	3.2	3.2	3.2
	Surface	79	4.0	4.0	4.0	4.3	4.3	4.3
	Incorp.	55	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	79	3.7	3.2	3.2	3.7	3.2	3.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- CITRUS

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	4.2	4.2	4.2	4.4	4.4	4.4
	Incorp.	3.9	3.9	3.9	3.9	3.9	3.9
Anaerobic	Surface	3.9	3.9	3.9	4.1	4.1	4.1
	Incorp.	3.6	3.1	3.1	3.6	3.1	3.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	117	4.9	4.9	4.9	5.2	5.2	5.2
	Surface	167	6.7	6.7	6.7	7.1	7.1	7.1
	Incorp.	117	4.4	4.3	4.3	4.4	4.3	4.3
	Incorp.	167	6.2	6.1	6.1	6.2	6.1	6.1
Anaerobic	Surface	117	4.5	4.5	4.5	4.8	4.8	4.8
	Surface	167	6.2	6.2	6.2	6.5	6.5	6.5
	Incorp.	117	4.0	3.5	3.4	4.0	3.5	3.4
	Incorp.	167	5.7	5.0	4.8	5.7	5.0	4.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	376	1.4	1.4	1.4	1.8	1.8	1.8
	Surface	537	1.9	1.9	1.9	2.2	2.2	2.2
	Incorp.	376	0.9	0.9	0.9	1.0	0.9	0.9
	Incorp.	537	1.4	1.3	1.3	1.4	1.3	1.3
Anaerobic	Surface	376	1.4	1.4	1.4	1.7	1.7	1.7
	Surface	537	1.7	1.7	1.7	2.1	2.1	2.1
	Incorp.	376	0.9	0.8	0.7	0.9	0.8	0.7
	Incorp.	537	1.2	1.1	1.1	1.2	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- FORAGES

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield t/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.6	0.6	0.6	0.9	0.9	0.9
	Surface	4	0.7	0.7	0.7	1.0	1.0	1.0
	Incorp.	2	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	2	0.6	0.6	0.6	0.8	0.8	0.8
	Surface	4	0.7	0.7	0.7	0.9	0.9	0.9
	Incorp.	2	0.3	0.2	0.2	0.3	0.2	0.2
	Incorp.	4	0.4	0.3	0.3	0.4	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- HORTICULTURE

		Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.7	3.7	3.7	3.9	3.9	3.9
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.4	3.4	3.4	3.6	3.6	3.6
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	48	1.6	1.6	1.6	1.9	1.9	1.9
	Surface	69	2.1	2.1	2.1	2.4	2.4	2.4
	Incorp.	48	1.2	1.2	1.2	1.2	1.2	1.2
	Incorp.	69	1.8	1.7	1.7	1.8	1.7	1.7
Anaerobic	Surface	48	1.5	1.5	1.5	1.7	1.7	1.7
	Surface	69	2.0	2.0	2.0	2.2	2.2	2.2
	Incorp.	48	1.1	1.0	1.0	1.1	1.0	1.0
	Incorp.	69	1.6	1.4	1.4	1.6	1.4	1.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.4	2.4	2.4	2.6	2.6	2.6
	Surface	130	3.1	3.1	3.1	3.3	3.3	3.3
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.8
Anaerobic	Surface	100	2.2	2.2	2.2	2.4	2.4	2.4
	Surface	130	2.8	2.8	2.8	3.0	3.0	3.0
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- RICE

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	4700	2.7	2.7	2.7	3.0	3.0	3.0
	Surface	6714	3.7	3.7	3.7	4.0	4.0	4.0
	Incorp.	4700	2.4	2.3	2.3	2.4	2.3	2.3
	Incorp.	6714	3.4	3.3	3.3	3.4	3.3	3.3
Anaerobic	Surface	4700	2.5	2.5	2.5	2.8	2.8	2.8
	Surface	6714	3.4	3.4	3.4	3.7	3.7	3.7
	Incorp.	4700	2.1	1.9	1.8	2.1	1.9	1.8
	Incorp.	6714	3.1	2.7	2.6	3.1	2.7	2.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	18	0.9	0.9	0.9	1.2	1.2	1.2
	Surface	26	1.2	1.2	1.2	1.4	1.4	1.4
	Incorp.	18	0.6	0.6	0.6	0.6	0.6	0.6
	Incorp.	26	0.8	0.8	0.8	0.8	0.8	0.8
Anaerobic	Surface	18	0.9	0.9	0.9	1.1	1.1	1.1
	Surface	26	1.1	1.1	1.1	1.4	1.4	1.4
	Incorp.	18	0.5	0.5	0.4	0.5	0.5	0.5
	Incorp.	26	0.7	0.6	0.6	0.7	0.7	0.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	62	2.6	2.6	2.6	3.0	3.0	3.0
	Surface	89	3.6	3.6	3.6	3.9	3.9	3.9
	Incorp.	62	2.1	2.1	2.1	2.1	2.1	2.1
	Incorp.	89	3.1	3.0	3.0	3.1	3.0	3.0
Anaerobic	Surface	62	2.4	2.4	2.4	2.8	2.8	2.8
	Surface	89	3.3	3.3	3.3	3.6	3.6	3.6
	Incorp.	62	1.9	1.7	1.7	1.9	1.7	1.7
	Incorp.	89	2.8	2.4	2.4	2.8	2.4	2.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	25	3.4	3.4	3.4	3.8	3.8	3.8
	Surface	36	4.7	4.7	4.7	5.0	5.0	5.0
	Incorp.	25	2.9	2.9	2.9	2.9	2.9	2.9
	Incorp.	36	4.2	4.1	4.1	4.2	4.1	4.1
Anaerobic	Surface	25	3.1	3.1	3.1	3.5	3.5	3.5
	Surface	36	4.3	4.3	4.3	4.6	4.6	4.6
	Incorp.	25	2.7	2.3	2.3	2.7	2.3	2.3
	Incorp.	36	3.8	3.3	3.3	3.8	3.3	3.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- SUNFLOWER

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield lb/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	1200	2.1	2.1	2.1	2.4	2.4	2.4
	Surface	1714	2.7	2.7	2.7	3.1	3.1	3.1
	Incorp.	1200	1.6	1.5	1.5	1.6	1.5	1.5
	Incorp.	1714	2.2	2.2	2.2	2.2	2.2	2.2
Anaerobic	Surface	1200	1.9	1.9	1.9	2.3	2.3	2.3
	Surface	1714	2.5	2.5	2.5	2.9	2.9	2.9
	Incorp.	1200	1.4	1.2	1.2	1.4	1.2	1.2
	incorp.	1714	2.0	1.8	1.7	2.0	1.8	1.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(C) ----- WHEAT

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	35	1.6	1.6	1.6	1.8	1.8	1.8
	Surface	50	2.1	2.1	2.1	2.3	2.3	2.3
	Incorp.	35	1.2	1.2	1.2	1.2	1.2	1.2
	Incorp.	50	1.7	1.7	1.7	1.7	1.7	1.7
Anaerobic	Surface	35	1.5	1.5	1.5	1.7	1.7	1.7
	Surface	50	1.9	1.9	1.9	2.2	2.2	2.2
	Incorp.	35	1.1	1.0	0.9	1.1	1.0	0.9
	Incorp.	50	1.6	1.4	1.3	1.6	1.4	1.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

TEXAS (W)

Crops Included:

Barley
Citrus
Corn
Cotton
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rice
Rye
Sorghum
Soybeans
Sun Flower
Wheat

Annual Sludge Application Rate, dry tons/acre *
TEXAS(W) ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	55	3.0	3.0	3.0	3.1	3.1	3.1
	Surface	79	4.2	4.2	4.2	4.3	4.3	4.3
	Incorp.	55	2.8	2.8	2.8	2.8	2.8	2.8
	Incorp.	79	4.1	4.0	4.0	4.1	4.0	4.0
Anaerobic	Surface	55	2.7	2.7	2.7	2.9	2.9	2.9
	Surface	79	3.8	3.8	3.8	4.0	4.0	4.0
	Incorp.	55	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	79	3.7	3.2	3.2	3.7	3.2	3.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(W) ----- CITRUS

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	4.1	4.1	4.1	4.1	4.1	4.1
	Incorp.	3.9	3.9	3.9	3.9	3.9	3.9
Anaerobic	Surface	3.7	3.7	3.7	3.8	3.8	3.8
	Incorp.	3.6	3.1	3.1	3.6	3.1	3.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(W) ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	117	4.6	4.6	4.6	4.7	4.7	4.7
	Surface	167	6.5	6.5	6.5	6.6	6.6	6.6
	Incorp.	117	4.4	4.3	4.3	4.4	4.3	4.3
	Incorp.	167	6.2	6.1	6.1	6.2	6.1	6.1
Anaerobic	Surface	117	4.2	4.2	4.2	4.4	4.4	4.4
	Surface	167	5.9	5.9	5.9	6.1	6.1	6.1
	Incorp.	117	4.0	3.5	3.4	4.0	3.5	3.4
	Incorp.	167	5.7	4.9	4.8	5.7	4.9	4.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(W) ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	376	1.2	1.2	1.2	1.3	1.3	1.3
	Surface	537	1.6	1.6	1.6	1.7	1.7	1.7
	Incorp.	376	0.9	0.9	0.9	0.9	0.9	0.9
	Incorp.	537	1.3	1.3	1.3	1.4	1.3	1.3
Anaerobic	Surface	376	1.1	1.1	1.1	1.2	1.2	1.2
	Surface	537	1.5	1.5	1.5	1.6	1.6	1.6
	Incorp.	376	0.9	0.8	0.7	0.9	0.8	0.7
	Incorp.	537	1.2	1.1	1.1	1.2	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(W) ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.4	0.4	0.4	0.5	0.5	0.5
	Surface	4	0.6	0.6	0.6	0.7	0.7	0.7
	Incorp.	2	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4
Anaerobic	Surface	2	0.4	0.4	0.4	0.5	0.5	0.5
	Surface	4	0.5	0.5	0.5	0.6	0.6	0.6
	Incorp.	2	0.3	0.2	0.2	0.3	0.2	0.2
	Incorp.	4	0.4	0.3	0.3	0.4	0.3	0.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

TEXAS(W) ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.6	3.6	3.6	3.7	3.7	3.7
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.3	3.3	3.3	3.3	3.3	3.3
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(W) ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	48	1.4	1.4	1.4	1.5	1.5	1.5
	Surface	69	1.9	1.9	1.9	2.0	2.0	2.0
	Incorp.	48	1.2	1.2	1.2	1.2	1.2	1.2
	Incorp.	69	1.8	1.7	1.7	1.8	1.7	1.7
Anaerobic	Surface	48	1.3	1.3	1.3	1.4	1.4	1.4
	Surface	69	1.8	1.8	1.8	1.9	1.9	1.9
	Incorp.	48	1.1	1.0	1.0	1.1	1.0	1.0
	Incorp.	69	1.6	1.4	1.4	1.6	1.4	1.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(W) ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 % Coarse Soil	Medium Soil	Fine Soil	Slope 3 to 6 % Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.3	2.3	2.3	2.4	2.4	2.4
	Surface	130	2.9	2.9	2.9	3.0	3.0	3.0
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.1	2.1	2.1	2.2	2.2	2.2
	Surface	130	2.7	2.7	2.7	2.8	2.8	2.8
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(W) ----- RICE

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	4700	2.5	2.5	2.5	2.6	2.6	2.6
	Surface	6714	3.5	3.5	3.5	3.6	3.6	3.6
	Incorp.	4700	2.4	2.3	2.3	2.4	2.3	2.3
	Incorp.	6714	3.4	3.3	3.3	3.4	3.3	3.3
Anaerobic	Surface	4700	2.3	2.3	2.3	2.4	2.4	2.4
	Surface	6714	3.2	3.2	3.2	3.3	3.3	3.3
	Incorp.	4700	2.1	1.9	1.8	2.1	1.9	1.8
	Incorp.	6714	3.1	2.7	2.6	3.1	2.7	2.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(W) ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	18	0.7	0.7	0.7	0.8	0.8	0.8
	Surface	26	1.0	1.0	1.0	1.1	1.1	1.1
	Incorp.	18	0.6	0.6	0.6	0.6	0.6	0.6
	Incorp.	26	0.8	0.8	0.8	0.8	0.8	0.8
Anaerobic	Surface	18	0.7	0.7	0.7	0.8	0.8	0.8
	Surface	26	0.9	0.9	0.9	1.0	1.0	1.0
	Incorp.	18	0.5	0.5	0.4	0.5	0.5	0.4
	Incorp.	26	0.7	0.6	0.6	0.7	0.6	0.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(W) ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	62	2.4	2.4	2.4	2.5	2.5	2.5
	Surface	89	3.3	3.3	3.3	3.4	3.4	3.4
	Incorp.	62	2.1	2.1	2.1	2.1	2.1	2.1
	Incorp.	89	3.0	3.0	3.0	3.0	3.0	3.0
Anaerobic	Surface	62	2.2	2.2	2.2	2.3	2.3	2.3
	Surface	89	3.0	3.0	3.0	3.2	3.2	3.2
	Incorp.	62	1.9	1.7	1.7	1.9	1.7	1.7
	Incorp.	89	2.8	2.4	2.4	2.8	2.4	2.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(W) ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	25	3.1	3.1	3.1	3.3	3.3	3.3
	Surface	36	4.4	4.4	4.4	4.6	4.6	4.6
	Incorp.	25	2.9	2.9	2.9	2.9	2.9	2.9
	Incorp.	36	4.2	4.1	4.1	4.2	4.1	4.1
Anaerobic	Surface	25	2.9	2.9	2.9	3.0	3.0	3.0
	Surface	36	4.0	4.0	4.0	4.2	4.2	4.2
	Incorp.	25	2.7	2.3	2.3	2.7	2.3	2.3
	Incorp.	36	3.8	3.3	3.3	3.8	3.3	3.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(W) ----- SUNFLOWER

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	1200	1.8	1.8	1.8	1.9	1.9	1.9
	Surface	1714	2.4	2.4	2.4	2.6	2.6	2.6
	Incorp.	1200	1.5	1.5	1.5	1.6	1.5	1.5
	Incorp.	1714	2.2	2.2	2.2	2.2	2.2	2.2
Anaerobic	Surface	1200	1.6	1.6	1.6	1.8	1.8	1.8
	Surface	1714	2.2	2.2	2.2	2.4	2.4	2.4
	Incorp.	1200	1.4	1.2	1.2	1.4	1.2	1.2
	Incorp.	1714	2.0	1.8	1.7	2.0	1.8	1.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
TEXAS(W) ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	35	1.4	1.4	1.4	1.5	1.5	1.5
	Surface	50	1.9	1.9	1.9	2.0	2.0	2.0
	Incorp.	35	1.2	1.2	1.2	1.2	1.2	1.2
	Incorp.	50	1.7	1.7	1.7	1.7	1.7	1.7
Anaerobic	Surface	35	1.3	1.3	1.3	1.4	1.4	1.4
	Surface	50	1.7	1.7	1.7	1.8	1.8	1.8
	Incorp.	35	1.1	1.0	0.9	1.1	1.0	0.9
	Incorp.	50	1.6	1.4	1.3	1.6	1.4	1.3

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

UTAH (East)

Crops Included:

Apples
Barley
Corn
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Wheat

UTAH(E) ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	80	4.2	4.2	4.2	4.2	4.2	4.2
	Surface	114	5.9	5.9	5.9	6.0	6.0	6.0
	Incorp.	80	4.1	4.1	4.1	4.1	4.1	4.1
	Incorp.	114	5.9	5.8	5.8	5.9	5.8	5.8
Anaerobic	Surface	80	3.8	3.8	3.8	3.8	3.8	3.8
	Surface	114	5.4	5.4	5.4	5.4	5.4	5.4
	Incorp.	80	3.8	3.3	3.2	3.8	3.3	3.2
	Incorp.	114	5.4	4.7	4.6	5.4	4.7	4.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
UTAH(E) ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	118	4.4	4.4	4.4	4.5	4.5	4.5
	Surface	169	6.3	6.3	6.3	6.4	6.4	6.4
	Incorp.	118	4.4	4.3	4.3	4.4	4.3	4.3
	Incorp.	169	6.3	6.2	6.2	6.3	6.2	6.2
Anaerobic	Surface	118	4.0	4.0	4.0	4.1	4.1	4.1
	Surface	169	5.8	5.8	5.8	5.8	5.8	5.8
	Incorp.	118	4.0	3.5	3.4	4.0	3.5	3.4
	Incorp.	169	5.7	5.0	4.9	5.7	5.0	4.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
UTAH(E) ----- FORAGES

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield t/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	4	0.4	0.4	0.4	0.5	0.5	0.5
	Surface	5	0.6	0.6	0.6	0.6	0.6	0.6
	Incorp.	4	0.4	0.4	0.4	0.4	0.4	0.4
	Incorp.	5	0.6	0.6	0.6	0.6	0.6	0.6
Anaerobic	Surface	4	0.4	0.4	0.4	0.4	0.4	0.4
	Surface	5	0.6	0.6	0.6	0.6	0.6	0.6
	Incorp.	4	0.4	0.3	0.3	0.4	0.3	0.3
	Incorp.	5	0.5	0.5	0.5	0.5	0.5	0.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
UTAH(E) ----- HORTICULTURE

		Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.5	3.5	3.5	3.5	3.5	3.5
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.2	3.2	3.2	3.2	3.2	3.2
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
UTAH(E) ----- OATS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	68	1.8	1.8	1.8	1.8	1.8	1.8
	Surface	97	2.5	2.5	2.5	2.6	2.6	2.6
	Incorp.	68	1.8	1.7	1.7	1.8	1.7	1.7
	Incorp.	97	2.5	2.5	2.5	2.5	2.5	2.5
Anaerobic	Surface	68	1.6	1.6	1.6	1.7	1.7	1.7
	Surface	97	2.3	2.3	2.3	2.3	2.3	2.3
	Incorp.	68	1.6	1.4	1.4	1.6	1.4	1.4
	Incorp.	97	2.3	2.0	1.9	2.3	2.0	1.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
UTAH(E) ----- PEACH,NECTARINE,CHERRY,PLUM

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.2	2.2	2.2	2.2	2.2	2.2
	Surface	130	2.8	2.8	2.8	2.8	2.8	2.8
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.0	2.0	2.0	2.0	2.0	2.0
	Surface	130	2.6	2.6	2.6	2.6	2.6	2.6
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
UTAH(E) ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	37	1.3	1.3	1.3	1.3	1.3	1.3
	Surface	53	1.9	1.9	1.9	1.9	1.9	1.9
	Incorp.	37	1.3	1.3	1.2	1.3	1.3	1.2
	Incorp.	53	1.8	1.8	1.8	1.8	1.8	1.8
Anaerobic	Surface	37	1.2	1.2	1.2	1.2	1.2	1.2
	Surface	53	1.7	1.7	1.7	1.7	1.7	1.7
	Incorp.	37	1.2	1.0	1.0	1.2	1.0	1.0
	Incorp.	53	1.7	1.4	1.4	1.7	1.4	1.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

VIRGINIA

Crops Included:

Apples
Barley
Corn
Cotton
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Rye
Sorghum
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
VIRGINIA ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.1	3.1	3.1	3.3	3.3	3.3
	Surface	130	4.0	4.0	4.0	4.2	4.2	4.2
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.9	2.9	2.9	3.0	3.0	3.0
	Surface	130	3.6	3.6	3.6	3.8	3.8	3.8
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
VIRGINIA ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	61	3.5	3.5	3.5	3.7	3.7	3.7
	Surface	87	4.8	4.8	4.8	5.0	5.0	5.0
	Incorp.	61	3.2	3.1	3.1	3.2	3.1	3.1
	Incorp.	87	4.5	4.4	4.4	4.5	4.4	4.4
Anaerobic	Surface	61	3.2	3.2	3.2	3.4	3.4	3.4
	Surface	87	4.4	4.4	4.4	4.6	4.6	4.6
	Incorp.	61	2.9	2.5	2.5	2.9	2.5	2.5
	Incorp.	87	4.1	3.6	3.5	4.1	3.6	3.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
VIRGINIA ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	101	4.2	4.2	4.2	4.5	4.5	4.5
	Surface	144	5.8	5.8	5.8	6.2	6.2	6.2
	Incorp.	101	3.8	3.7	3.7	3.8	3.7	3.7
	Incorp.	144	5.4	5.3	5.3	5.4	5.3	5.3
Anaerobic	Surface	101	3.9	3.9	3.9	4.2	4.2	4.2
	Surface	144	5.3	5.3	5.3	5.7	5.7	5.7
	Incorp.	101	3.4	3.0	2.9	3.4	3.0	2.9
	Incorp.	144	4.9	4.3	4.2	4.9	4.3	4.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
VIRGINIA ----- COTTON

Sludge Type	Type of Applic.	Expected Yield lb/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	640	2.1	2.1	2.1	2.4	2.4	2.4
	Surface	914	2.7	2.7	2.7	3.1	3.1	3.1
	Incorp.	640	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	914	2.3	2.3	2.3	2.3	2.3	2.3
Anaerobic	Surface	640	1.9	1.9	1.9	2.2	2.2	2.2
	Surface	914	2.5	2.5	2.5	2.9	2.9	2.9
	Incorp.	640	1.5	1.3	1.3	1.5	1.3	1.3
	Incorp.	914	2.1	1.8	1.8	2.1	1.8	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
VIRGINIA ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	2	0.5	0.5	0.5	0.7	0.7	0.7
	Surface	2	0.6	0.6	0.6	0.8	0.8	0.8
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	2	0.3	0.3	0.3	0.3	0.3	0.3
Anaerobic	Surface	2	0.5	0.5	0.5	0.7	0.7	0.7
	Surface	2	0.5	0.5	0.5	0.8	0.8	0.8
	Incorp.	2	0.2	0.2	0.2	0.2	0.2	0.2
	Incorp.	2	0.3	0.2	0.2	0.3	0.2	0.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
VIRGINIA ----- HORTICULTURE

Sludge Type	Type of Applic.	Slope 0 to 3 %			Slope 3 to 6 %		
		Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.7	3.7	3.7	3.9	3.9	3.9
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.4	3.4	3.4	3.6	3.6	3.6
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
VIRGINIA ----- OATS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	 Medium Soil	 Fine Soil	Slope 3 to 6 % Coarse Soil	 Medium Soil	 Fine Soil
Aerobic	Surface	50	1.6	1.6	1.6	1.8	1.8	1.8
	Surface	71	2.2	2.2	2.2	2.4	2.4	2.4
	Incorp.	50	1.3	1.3	1.3	1.3	1.3	1.3
	Incorp.	71	1.8	1.8	1.8	1.8	1.8	1.8
Anaerobic	Surface	50	1.5	1.5	1.5	1.7	1.7	1.7
	Surface	71	2.0	2.0	2.0	2.2	2.2	2.2
	Incorp.	50	1.2	1.0	1.0	1.2	1.0	1.0
	Incorp.	71	1.7	1.5	1.4	1.7	1.5	1.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
VIRGINIA ----- PEACH,NECTARINE,CHERRY,PLUM

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 % Coarse Soil	 Medium Soil	 Fine Soil	Slope 3 to 6 % Coarse Soil	 Medium Soil	 Fine Soil
Aerobic	Surface	100	2.4	2.4	2.4	2.6	2.6	2.6
	Surface	130	3.0	3.0	3.0	3.2	3.2	3.2
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.2	2.2	2.2	2.4	2.4	2.4
	Surface	130	2.8	2.8	2.8	3.0	3.0	3.0
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
VIRGINIA ----- RYE

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	28	1.2	1.2	1.2	1.4	1.4	1.4
	Surface	40	1.6	1.6	1.6	1.8	1.8	1.8
	Incorp.	28	0.9	0.9	0.9	0.9	0.9	0.9
	Incorp.	40	1.3	1.2	1.2	1.3	1.2	1.2
Anaerobic	Surface	28	1.1	1.1	1.1	1.4	1.4	1.4
	Surface	40	1.5	1.5	1.5	1.7	1.7	1.7
	Incorp.	28	0.8	0.7	0.7	0.8	0.7	0.7
	Incorp.	40	1.1	1.0	1.0	1.2	1.0	1.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
VIRGINIA ----- SORGHUM

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	53	2.3	2.3	2.3	2.6	2.6	2.6
	Surface	76	3.1	3.1	3.1	3.4	3.4	3.4
	Incorp.	53	1.8	1.8	1.8	1.8	1.8	1.8
	Incorp.	76	2.6	2.6	2.6	2.6	2.6	2.6
Anaerobic	Surface	53	2.1	2.1	2.1	2.4	2.4	2.4
	Surface	76	2.8	2.8	2.8	3.1	3.1	3.1
	Incorp.	53	1.7	1.5	1.4	1.7	1.5	1.4
	Incorp.	76	2.4	2.1	2.0	2.4	2.1	2.0

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
VIRGINIA ----- SOYBEANS

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	29	3.8	3.8	3.8	4.1	4.1	4.1
	Surface	41	5.3	5.3	5.3	5.6	5.6	5.6
	Incorp.	29	3.4	3.4	3.4	3.4	3.4	3.4
	Incorp.	41	4.9	4.8	4.8	4.9	4.8	4.8
Anaerobic	Surface	29	3.5	3.5	3.5	3.8	3.8	3.8
	Surface	41	4.9	4.9	4.9	5.2	5.2	5.2
	Incorp.	29	3.1	2.7	2.7	3.1	2.7	2.7
	Incorp.	41	4.4	3.9	3.8	4.4	3.9	3.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
VIRGINIA ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	44	1.8	1.8	1.8	2.1	2.1	2.1
	Surface	63	2.5	2.5	2.5	2.7	2.7	2.7
	Incorp.	44	1.5	1.5	1.5	1.5	1.5	1.5
	Incorp.	63	2.2	2.1	2.1	2.2	2.1	2.1
Anaerobic	Surface	44	1.7	1.7	1.7	1.9	1.9	1.9
	Surface	63	2.3	2.3	2.3	2.5	2.5	2.5
	Incorp.	44	1.4	1.2	1.2	1.4	1.2	1.2
	Incorp.	63	2.0	1.7	1.7	2.0	1.7	1.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

WASHINGTON

Crops Included:

Apples
Barley
Corn
Forages
Horticulture
Oats
Peach, Nectarine, Cherry, Plum
Pear
Rye
Tree Farming
Wheat

Annual Sludge Application Rate, dry tons/acre *
WASHINGTON ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.9	2.9	2.9	2.9	2.9	2.9
	Surface	130	3.8	3.8	3.8	3.8	3.8	3.8
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.6	2.6	2.6	2.7	2.7	2.7
	Surface	130	3.4	3.4	3.4	3.5	3.5	3.5
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WASHINGTON ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	64	3.4	3.4	3.4	3.4	3.4	3.4
	Surface	91	4.8	4.8	4.8	4.8	4.8	4.8
	Incorp.	64	3.3	3.3	3.2	3.3	3.3	3.2
	Incorp.	91	4.7	4.6	4.6	4.7	4.6	4.6
Anaerobic	Surface	64	3.1	3.1	3.1	3.1	3.1	3.1
	Surface	91	4.3	4.3	4.3	4.4	4.4	4.4
	Incorp.	64	3.0	2.6	2.6	3.0	2.6	2.6
	Incorp.	91	4.3	3.7	3.7	4.3	3.7	3.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WASHINGTON ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	160	6.0	6.0	6.0	6.1	6.1	6.1
	Surface	229	8.6	8.6	8.6	8.6	8.6	8.6
	Incorp.	160	6.0	5.9	5.9	6.0	5.9	5.9
	Incorp.	229	8.5	8.4	8.4	8.5	8.4	8.4
Anaerobic	Surface	160	5.5	5.5	5.5	5.5	5.5	5.5
	Surface	229	7.8	7.8	7.8	7.9	7.9	7.9
	Incorp.	160	5.4	4.7	4.6	5.4	4.7	4.6
	Incorp.	229	7.7	6.8	6.6	7.7	6.8	6.6

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WASHINGTON ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 % Coarse Soil	Slope 0 to 3 % Medium Soil	Slope 0 to 3 % Fine Soil	Slope 3 to 6 % Coarse Soil	Slope 3 to 6 % Medium Soil	Slope 3 to 6 % Fine Soil
Aerobic	Surface	3	0.4	0.4	0.4	0.5	0.5	0.5
	Surface	5	0.6	0.6	0.6	0.6	0.6	0.6
	Incorp.	3	0.4	0.4	0.4	0.4	0.4	0.4
	Incorp.	5	0.5	0.5	0.5	0.5	0.5	0.5
Anaerobic	Surface	3	0.4	0.4	0.4	0.4	0.4	0.4
	Surface	5	0.5	0.5	0.5	0.6	0.6	0.6
	Incorp.	3	0.3	0.3	0.3	0.3	0.3	0.3
	Incorp.	5	0.5	0.4	0.4	0.5	0.4	0.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WASHINGTON ----- HORTICULTURE

		Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.5	3.5	3.5	3.5	3.5	3.5
¦	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.2	3.2	3.2	3.2	3.2	3.2
¦	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WASHINGTON ----- OATS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	63	1.7	1.7	1.7	1.7	1.7	1.7
¦	Surface	90	2.4	2.4	2.4	2.4	2.4	2.4
¦	Incorp.	63	1.6	1.6	1.6	1.6	1.6	1.6
¦	Incorp.	90	2.3	2.3	2.3	2.3	2.3	2.3
Anaerobic	Surface	63	1.5	1.5	1.5	1.6	1.6	1.6
¦	Surface	90	2.2	2.2	2.2	2.2	2.2	2.2
¦	Incorp.	63	1.5	1.3	1.3	1.5	1.3	1.3
¦	Incorp.	90	2.1	1.8	1.8	2.1	1.8	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WASHINGTON ----- PEACH,NECTARINE,CHERRY,PLUM

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	2.2	2.2	2.2	2.2	2.2	2.2
	Surface	130	2.8	2.8	2.8	2.9	2.9	2.9
	Incorp.	100	2.2	2.1	2.1	2.2	2.1	2.1
	Incorp.	130	2.8	2.8	2.7	2.8	2.8	2.7
Anaerobic	Surface	100	2.0	2.0	2.0	2.0	2.0	2.0
	Surface	130	2.6	2.6	2.6	2.6	2.6	2.6
	Incorp.	100	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	130	2.5	2.2	2.2	2.5	2.2	2.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WASHINGTON ----- PEARS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield trees/ac	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	1.1	1.1	1.1	1.2	1.2	1.2
	Surface	130	1.5	1.5	1.5	1.5	1.5	1.5
	Incorp.	100	1.1	1.1	1.1	1.1	1.1	1.1
	Incorp.	130	1.4	1.4	1.4	1.4	1.4	1.4
Anaerobic	Surface	100	1.0	1.0	1.0	1.1	1.1	1.1
	Surface	130	1.3	1.3	1.3	1.4	1.4	1.4
	Incorp.	100	1.0	0.9	0.8	1.0	0.9	0.8
	Incorp.	130	1.3	1.1	1.1	1.3	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre
WASHINGTON ----- TREE FARMING *

		Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	5.8	5.8	5.8	5.8	5.8	5.8
	Incorp.	5.7	5.6	5.6	5.7	5.6	5.6
Anaerobic	Surface	5.3	5.3	5.3	5.3	5.3	5.3
	Incorp.	5.2	4.6	4.5	5.2	4.6	4.5

* Includes white pines, Douglas-fir, southern pine, spruce, aspen, oak, and hickory.

Annual Sludge Application Rate, dry tons/acre *
WASHINGTON ----- WHEAT

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	64	2.2	2.2	2.2	2.3	2.3	2.3
	Surface	91	3.2	3.2	3.2	3.2	3.2	3.2
	Incorp.	64	2.2	2.2	2.2	2.2	2.2	2.2
	Incorp.	91	3.1	3.1	3.1	3.1	3.1	3.1
Anaerobic	Surface	64	2.1	2.1	2.1	2.1	2.1	2.1
	Surface	91	2.9	2.9	2.9	2.9	2.9	2.9
	Incorp.	64	2.0	1.7	1.7	2.0	1.7	1.7
	Incorp.	91	2.9	2.5	2.4	2.9	2.5	2.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

RECOMMENDED SLUDGE APPLICATION RATES FOR:

WISCONSIN

Crops Included:

Apples
Barley
Corn
Forages
Horticulture
Oats
Rye
Soybeans
Wheat

Annual Sludge Application Rate, dry tons/acre *
WISCONSIN ----- APPLES

Sludge Type	Type of Applic.	Expected Yield trees/ac	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	100	3.0	3.0	3.0	3.1	3.1	3.1
	Surface	130	3.9	3.9	3.9	4.0	4.0	4.0
	Incorp.	100	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	130	3.7	3.7	3.7	3.7	3.7	3.7
Anaerobic	Surface	100	2.8	2.8	2.8	2.9	2.9	2.9
	Surface	130	3.5	3.5	3.5	3.7	3.7	3.7
	Incorp.	100	2.6	2.3	2.2	2.6	2.3	2.2
	Incorp.	130	3.4	3.0	2.9	3.4	3.0	2.9

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WISCONSIN ----- BARLEY

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	56	3.1	3.1	3.1	3.2	3.2	3.2
	Surface	80	4.3	4.3	4.3	4.5	4.5	4.5
	Incorp.	56	2.9	2.8	2.8	2.9	2.8	2.8
	Incorp.	80	4.1	4.1	4.1	4.1	4.1	4.1
Anaerobic	Surface	56	2.8	2.8	2.8	3.0	3.0	3.0
	Surface	80	4.0	4.0	4.0	4.1	4.1	4.1
	Incorp.	56	2.6	2.3	2.2	2.6	2.3	2.3
	Incorp.	80	3.8	3.3	3.2	3.8	3.3	3.2

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WISCONSIN ----- CORN

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	108	4.3	4.3	4.3	4.5	4.5	4.5
	Surface	154	6.0	6.0	6.0	6.2	6.2	6.2
	Incorp.	108	4.0	4.0	4.0	4.0	4.0	4.0
	Incorp.	154	5.8	5.7	5.6	5.8	5.7	5.6
Anaerobic	Surface	108	3.9	3.9	3.9	4.1	4.1	4.1
	Surface	154	5.5	5.5	5.5	5.7	5.7	5.7
	Incorp.	108	3.7	3.2	3.1	3.7	3.2	3.1
	Incorp.	154	5.2	4.6	4.5	5.2	4.6	4.5

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WISCONSIN ----- FORAGES

Sludge Type	Type of Applic.	Expected Yield t/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3	0.6	0.6	0.6	0.7	0.7	0.7
	Surface	5	0.8	0.8	0.8	0.9	0.9	0.9
	Incorp.	3	0.4	0.4	0.4	0.4	0.4	0.4
	Incorp.	5	0.6	0.6	0.6	0.6	0.6	0.6
Anaerobic	Surface	3	0.5	0.5	0.5	0.7	0.7	0.7
	Surface	5	0.7	0.7	0.7	0.8	0.8	0.8
	Incorp.	3	0.4	0.3	0.3	0.4	0.3	0.3
	Incorp.	5	0.5	0.5	0.4	0.5	0.5	0.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WISCONSIN ----- HORTICULTURE

		Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	3.6	3.6	3.6	3.7	3.7	3.7
	Incorp.	3.4	3.4	3.4	3.4	3.4	3.4
Anaerobic	Surface	3.3	3.3	3.3	3.4	3.4	3.4
	Incorp.	3.1	2.7	2.7	3.1	2.7	2.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WISCONSIN ----- OATS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	58	1.7	1.7	1.7	1.8	1.8	1.8
	Surface	83	2.3	2.3	2.3	2.5	2.5	2.5
	Incorp.	58	1.5	1.5	1.5	1.5	1.5	1.5
	Incorp.	83	2.1	2.1	2.1	2.1	2.1	2.1
Anaerobic	Surface	58	1.6	1.6	1.6	1.7	1.7	1.7
	Surface	83	2.1	2.1	2.1	2.3	2.3	2.3
	Incorp.	58	1.4	1.2	1.2	1.4	1.2	1.2
	Incorp.	83	1.9	1.7	1.7	1.9	1.7	1.7

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WISCONSIN ----- RYE

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	30	1.1	1.1	1.1	1.3	1.3	1.3
	Surface	43	1.6	1.6	1.6	1.7	1.7	1.7
	Incorp.	30	0.9	0.9	0.9	0.9	0.9	0.9
	Incorp.	43	1.4	1.3	1.3	1.4	1.3	1.3
Anaerobic	Surface	30	1.1	1.1	1.1	1.2	1.2	1.2
	Surface	43	1.4	1.4	1.4	1.6	1.6	1.6
	Incorp.	30	0.9	0.8	0.7	0.9	0.8	0.7
	Incorp.	43	1.2	1.1	1.1	1.2	1.1	1.1

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WISCONSIN ----- SOYBEANS

			Slope 0 to 3 %			Slope 3 to 6 %		
Sludge Type	Type of Applic.	Expected Yield bu/acre	Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	34	4.3	4.3	4.3	4.5	4.5	4.5
	Surface	49	6.0	6.0	6.0	6.2	6.2	6.2
	Incorp.	34	4.0	3.9	3.9	4.0	3.9	3.9
	Incorp.	49	5.7	5.6	5.6	5.7	5.6	5.6
Anaerobic	Surface	34	3.9	3.9	3.9	4.1	4.1	4.1
	Surface	49	5.5	5.5	5.5	5.6	5.6	5.6
	Incorp.	34	3.6	3.2	3.1	3.6	3.2	3.1
	Incorp.	49	5.2	4.5	4.4	5.2	4.5	4.4

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

Annual Sludge Application Rate, dry tons/acre *
WISCONSIN ----- WHEAT

Sludge Type	Type of Applic.	Expected Yield bu/acre	Slope 0 to 3 %			Slope 3 to 6 %		
			Coarse Soil	Medium Soil	Fine Soil	Coarse Soil	Medium Soil	Fine Soil
Aerobic	Surface	46	1.8	1.8	1.8	1.9	1.9	1.9
	Surface	66	2.5	2.5	2.5	2.6	2.6	2.6
	Incorp.	46	1.6	1.6	1.6	1.6	1.6	1.6
	Incorp.	66	2.3	2.2	2.2	2.3	2.2	2.2
Anaerobic	Surface	46	1.6	1.6	1.6	1.8	1.8	1.8
	Surface	66	2.3	2.3	2.3	2.4	2.4	2.4
	Incorp.	46	1.4	1.3	1.2	1.4	1.3	1.2
	Incorp.	66	2.1	1.8	1.8	2.1	1.8	1.8

* For wet tons/acre, divide the dry rate by the total solids fraction in the sludge.

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APPENDIX D

USER COMMENT SHEET

The objective of this manual is to provide an easy-to-use source of information for users who wish to apply sewage sludge to their soils. It is important to the authors to determine whether this goal is being met, and to identify ways to make the manual more useful. Therefore, the following questionnaire offers users the opportunity to comment on the manual. Comments will be considered and incorporated into subsequent editions. Additional comments can be written below the questionnaire or on a sp earate sheet of paper. Both specific and general comments are encouraged. Send all comments to:

Criteria and Standards Divsion (WH-585)
Office of Water Regulations and Standards
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Please circle the letter corresponding to your answer on the line.

1. I found the manual to be (a) very useful (b) somewhat useful (c) not useful at all.

2. The manual is (a) too complex (b) somewhat complex (c) of about the right level of complexity.

3. The manual is (a) too long (b) too short (c) of about the right length.

4. The recommended values for sludge application are (a) too high (b) too low (c) about right.

5. By the following the recommended application rates, I will realize (a) a substantial reduction in fertilizer costs (b) a minor reduction in fertilizer costs (c) no reduction in fertilizer costs.

6. The manual considers three soil types, representing coars, medium, and fine-textured soils. (a) Additional soil types should be considered (b) fewer soil tpes should be considered (c) the present consideration is adequate.

7. Two sludge types are represented: aerobically and anaerobically digested sludge. (a) Additional sludge types should be considered (b) only one type should be considered (c) the present consideration is adequate.

8. Two slope ranges are represented: 0-3% and 3-6%. (a) Additional slopes should be considered (b) Fewer slopes should be considered; (c) the present consideration is adequate.

9. The methods of sludge application considered include surface-applied and incorporated. (a) Additional methods of application should be considered (b) only one method of application should be considered (c) the present consideration is adequate.

10. Runoff potential is estimated by use of the Universal Soil Loss Equation. This approach seems (a) adequate (b) inadequate.

11. The manual suggests that surface application of sludge be practiced with caution and allows for only a portion of a watershed to receive surface-applied sludge. The approach is (a) warranted, (b) too conservative, (c) I do not know.

12. The table that describes what portion of a watershed may receive surface-applied sludge is (a) very useful, (b) somewhat useful, (c) not useful at all.

13. The potential for heavy metal pollution of soils is not considered in the manual. Considering the application rates recommended, heavy metal pollution (a) should be considered, (b) should not be considered.